LSU

Department of
Biological & Agricultural
Engineering

SPRING 2020 NEWSLETTER

DEPARTMENT HIGHLIGHTS

BAE Department

The Department of Biological and Agricultural Engineering would like to thank all alumni, scholarship supporters, industry partners, and advisory council members for your dedication to improving the department and the education provided to current BE students. The BAE community has grown and is more active than ever before. With your support, we are providing more opportunities to students in scholarships, internships, healthcare experiences, and in senior design and empowering those students to reach their goals.

Thank you for your support!

Advisory Council

Mission

The mission of the advisory council is to advise and counsel the chairperson and the faculty of the Department of Biological and Agricultural Engineering (BAE) on matters pertaining to academic quality and stature of the department. The council will advise on how the department and college can improve relationships and meet the needs of students, industry, commerce, government, and the society through best utilization of available resources. This includes actively supporting the department's development efforts in securing additional resources through individuals and industry.

Goals for 2019–2020

- Provide funding for two BAE department seminar speakers
- Support and improve the BESO (Biological Engineering Student Organization) Lounge with new furniture and appliances
- Invite alumni and industry partners to senior design final presentations
- Invite alumni to the BESO Crawfish Boil

LSU BE Alumnus Designs Drainage for Tiger Stadium

When alumnus Danny Dehon began working in coastal restoration, he never dreamed that it would land him back where he started—LSU's campus. And Dehon certainly never dreamed the land he'd be working to save would be the one inside Tiger Stadium.

Born and raised in New Orleans, Dehon came to LSU in 2003, majoring in biological sciences before switching to biological engineering his sophomore year.

"I had a strong math and biology background in high school and felt that BE was a good merger of the two," he said. "Growing up in South Louisiana, fishing with my family and being out on the water was something I loved to do, so I wanted to focus on coastal engineering."

After earning his bachelor's in 2008, Dehon remained at LSU and earned his master's in BE. Immediately after graduating, he worked as a field scientist for a British Petroleum (BP) contractor, Cardno, alongside a team of four scientists and boat operators to track submerged oil throughout the Gulf of Mexico.

"We were stationed in different cities between Louisiana and Florida for two to three weeks, then would go home to get our next assignment," Dehon said. "I wasn't really utilizing my degree, but I stayed for six months."

He then reconnected with fellow BE graduate Tyler Ortego, who had started his own company, Ora Engineering. Dehon followed up Ortego's research on artificial oysteries, a technology Ortego had taken to the commercial scale.

"I worked with him on engineering design for nearly three years, working out of my house and also in the field," Dehon said.

In 2013, Dehon began working for Manchac Consulting Group, where he served as a coastal engineer on all of the company's coastal projects, which included marsh creation, bank stabilization, artificial reefs, island construction, and sediment transport. The most exciting project, however, came when the company got a contract to work on drainage in LSU's Tiger Stadium.

"I started working with LSU 18 months ago and worked with a landscape architect who has done a number of SEC fields," Dehon said. "So, he was the guy I leaned on for the irrigation and the under-drain system out there. I could take care of drainage on the sidelines, concrete work, and civil site work, and adding drainage capacity."

Dehon credits LSU BE Professor Marybeth Lima's Community Playground Project for helping him with his work on a daily basis.

"Dr. Lima is awesome," he said. "One of the big things most people take away from her class is the work you get to do on the playground projects. It's very fulfilling. Looking back, it's very applicable to working with building standards and design and working with a client and going through a design process on a project."

Though Dehon has recently accepted a new position with Fenstermaker & Associates, an engineering consulting firm in Baton Rouge, the excitement of working on the field in Tiger Stadium will be hard to top.

"I had goosebumps the first few times I was out there," he said. "Being out there at the field level really puts things into perspective. I couldn't imagine being out there on the field during a game with 100,000 fans. I've been an LSU fan even before I went there and have memories of watching some great games."

The next time the Tigers play in the rain and aren't treading water to run the ball, LSU fans know who to thank.

LSU AgCenter Professor Co-Authors Book Protecting Coastal Cities

Claudette Reichel, professor and extension housing specialist with the LSU AgCenter and director of LaHouse Research Center, is one of the chapter authors of a new book titled, *Protecting Historic Coastal Cities*. The book was spearheaded by the Galveston Historical Foundation as part of its resiliency initiative.

Reichel's chapter, *Resilient Housing Lessons From Katrina*, describes the unprecedented housing issues and challenges following the massive disaster and highlights the critical need for resilient rebuilding and housing stock. It also details the flood- and hurricane-hardy building systems demonstrated in two prototype high-performance homes built in New Orleans following the storm (via a partnership project of the LSU AgCenter, U.S. Department of Energy Building America Program, Building Science Corp., and Catholic Charities NOLA.

The chapter conclusion cites the AgCenter's LaHouse Resource Center as a "showcase of solutions" for resilient homes.

The book, published by Texas A&M University Press, is available now on Amazon

LSU Engineering Professors Offer Lab Experience to Science Olympiad Team

LSU Engineering professors gave students at Glasgow Middle School in Baton Rouge the opportunity to work in their labs in preparation for the next Science Olympiad National Tournament. GMS had one team in Division B (grades 6-8) this year and jumped from 48 to 32 in the rankings.

Serving as an interdisciplinary support group for the students were LSU Biological Engineering professors Philip Jung and Yongchan Kwon and Construction Management Professor Yongcheol Lee, all of whom invited 20 Science Olympiad team members and teachers to their labs to help them prepare for the competition and to further support the engagement of STEM activities with more GMS students.

"LSU's College of Engineering has an excellent history of support for future engineers through prestigious outreach programs," Jung said. "I wondered if the GMS team was supported with the resources available at LSU to compete with advanced knowledge and bring a better outcome than last year."

One of the highest demands from the students and teachers was computer simulation and biotechnology skills. Using the MMR Building Information Modeling (BIM) Cave in Patrick F. Taylor Hall, Lee demonstrated how the cave can be incorporated into architecture and CM research studies. He also showed the students how building information modeling has been used to improve current architectural designs and construction processes, including automated design validation, 3D facility modeling, 4D visualization, and smart building.

“The students can now get more information about the existing research studies in these domains and raise their own ideas for the Olympiad competition,” Lee said.

Kwon introduced the students to his cell-free synthetic biology lab and its high-end equipment. Kwon and his doctoral student, Caroline Copeland, also gave a short lecture on recombinant DNA technology, polymerase chain reaction, and DNA purification and visualization.

“I want the students to get more insight about how biology’s basic principles work,” Kwon said. “I would like the students to open their imagination to nature, which is critical in developing engineers and scientists in the younger generation.”

Jung, who coordinated this program with GMS teachers Madelon Kelly and Kelly McFatter, looks forward to working with the students year-round to help them prepare for the national competition.

“As a parent, I saw how disciplined the team was, practicing each event every week,” Jung said. “They meet at least once a week after school and once on the weekend at a local library. Individual teams were gathered to practice their subjects whenever they needed to. Even though they were in different grades, students were very enthusiastic and eager to practice each event through multiple semesters. In addition, many parents voluntarily supported the team financially and intellectually.”

Jung said the majority of the financial support came from parents, fundraising and donations. Until recently, GMS did not have a lab microscope and students had to run experiments without personal protection equipment.

“Adrienne Steele [LSU assistant director of student programs and outreach], David Constant [LSU BAE department chair], and Craig Harvey [LSU associate dean for academic affairs] showed quick and positive responses for any possible intellectual and financial support,” Jung said. “They are planning to support the team in upcoming years.”

The next Science Olympiad will take place at North Carolina State University in the summer of 2020.

Royal Rookery: LSU BE Alumna Helps Restore Queen Bess Island

It's been 51 years since the brown pelican was reintroduced to Louisiana after the species completely disappeared from the state due to pesticide use in the 1960s. Since then, it has thrived on Queen Bess Island, making it the third largest brown pelican rookery in Louisiana. Another battle looms, however.

Over the years, Queen Bess Island has sunk and eroded into the Gulf of Mexico, leaving less than five acres of suitable land for the pelicans to nest. Racing against the clock, engineers like LSU Biological Engineering alumna Amanda Phillips are working to restore the island's nesting area to its once-vast size, giving the state bird another chance to prosper.

"This project is different than others," said Phillips, a coastal engineer for Fenstermaker in New Orleans. "In many respects, a lot of the projects that have been constructed over the years have been general sense-type projects. A marsh project will restore habitat but it's really just filling in the holes that have developed over the years. But with this project, you had something to identify with—pelican and tern habitat. It's tangible."

Queen Bess Island, a patch of land about two miles north of Grand Isle in Barataria Bay, is the site for 15%-20% of the state's brown pelican nesting activity. The island is also home to 60 other bird species, such as egrets, herons, terns, gulls, roseate spoonbills, ibis, and others. During breeding season, a few thousand pelicans crowd onto five acres of land surrounded by rock barriers that were installed in the 1990s. The goal of the restoration project, which Phillips has been working on since 2017, is to provide a quality habitat for these birds to nest.

Working alongside the Louisiana Department of Wildlife and Fisheries, Coastal Protection and Restoration Authority, and the U.S. Departments of Fish and Wildlife Services, Phillips designed the best way to restore the island in a small amount of time.

The Queen Bess Island project is one of the fastest moving restoration projects the state has seen. There is only a window of six months to complete the project during the non-nesting season in order for the birds to be able to lay eggs in the spring. Mother Nature doesn't wait and neither do these researchers and engineers.

"One of the nuisances of this project is they did not want any construction occurring when the birds show up to nest," Phillips said. "Pelicans tend to nest where they were born. There could be large ramifications if their nesting were affected. Wildlife and Fisheries really wanted the construction to happen after nesting season, which is after Septenmber 15 and before nesting season starts on March 15."

As soon as the project was approved in March 2019, a contract was awarded by June and on August 1, the contractor was able to take plant samples and start growing them in a greenhouse to later replant on Queen Bess Island.

It ended up going very smoothly and worked out well, which is a testament to all the people involved and knowing this project was so critical," Phillips said. "When Wildlife and Fisheries gave the go-ahead to get out there as soon as the birds left, they were out there slinging sand as soon as possible."

Now in its final stages, the Queen Bess Island project will provide 30 acres of restored brown pelican and wading bird habitat, along with seven acres of nesting tern and black skimmer habitat. In order to increase the island to 37 acres, sediment had to be dredged from the Mississippi River near Belle Chase and then barged to the site. The sand was then poured to help elevate the island. Contractors sloped the island from the highest elevation at the southwest end and the lowest at the northeast end.

The project will make marsh habitat accessible for fish and protect it with a breakwater to reduce wave and tidal erosion. A row of breakwaters on the south side of the island will also give young birds a safe, calm area for swimming with easy access to the water. Limestone will cover about one-third of the island to provide habitat for other bird species looking for beachfront property.

“It’s not a very large island but it is isolated, so there aren’t any predators on it,” Phillips said. “It’s very safe and that’s what makes it special. Having scientists in the room who have studied, lived and breathed these birds and what they eat gave me and our team feedback that led to constructive solutions.”

With the exception of the habitat for terns and skimmers that prefer barren ground, most areas of the island will be planted with native vegetation like marsh elder, matrimony vine, and black mangroves, which pelicans prefer to nest in. The restoration is expected to last at least 20 years, with money set aside for necessary upgrades.

The $18.7 million project comes nearly 10 years after the Deepwater Horizon oil spill in the Gulf of Mexico and is part of the billion-dollar settlement from British Petroleum. It’s also part of the Natural Resource Damage Assessment.

“There are three big pots of money with three affected states—Louisiana, Texas and Florida—having access to these pots,” Phillips said. “The projects that were proposed by each state are being funded by these imposed fines on BP.”

The construction part of the restoration project was $10 million, the design was $1.5-$2 million and the remaining funding will go toward future maintenance.

When all is said and done, Phillips will have had a hand in saving Louisiana’s state bird.

“We all recognize this to be an ongoing issue and we were able to bring our various skills to the table and develop a project that we are all proud of,” Phillips said. “We’ve painted this big picture and we’re about to see what the birds think of it.”

Not only will the project help the pelicans, but Phillips hopes it will also inspire people in her line of work.

“It makes me beam every time I talk about this project because it has such a potential positive,” she said. “It may help people have a better understanding of what coastal restoration and engineering is all about.”

STUDENT HIGHLIGHTS

BESO

Our Mission

As a professional networking organization, BESO aims to forge connections through catered meetings, workshops, and events between its members and the local people and communities representing biological engineering. This year, BESO secured the opportunity to develop national connections after LSU became an active chapter of BMES and ASABE.

Fall Meeting

BESO started off the semester with a social on September 4. Students of all classifications met for free food, trivia, and games. There, members of BESO expressed professional interests in medical school, graduate school, and industry.

On October 9, LSU alumnae Sarah Davis spoke to members at the second general meeting about her experiences designing Class 1 orthopedic products and working as a quality control specialist for the medical device company, DeRoyal. She also spoke about when graduate school would be a good fit for some students, depending on their career goals.

On November 6, guest speakers Joshua Tate, Oliver Vicknair (both BE alumni), and Trey Fury, from medical device company Biosense Webster, met with BESO members about their role as clinical specialists in cardiovascular operations. Fury emphasized that BE students were well-qualified for this career path since it requires understanding of physics, biology, and computer programs, as well as problem-solving skills for individual case studies.

Fall Sweet Potato and Rice Sale

Together with local company Southside Produce, BESO has brought the people of Baton Rouge a taste of Iota, Louisiana's high-quality sweet potatoes and popcorn rice. BESO raised a net profit of more than $3,100, making this the best sale the team has had in the past five years.

BESO 2019-2020 Officers

President
Gabrielle Kerkow

Vice President
Jackie Begue

Secretary
Savannah Heath

Treasurer
Elena Soto Handal

Social Chair
Tiffany Pham

Outreach Chair
Tim Dobroski

Fundraising Chair
Chris Bologna

Fundraising Assistant Chairs
Jack Marzulo
Leander Bonmardion
Alexis Benoit

Congratulations to our December Graduates!

We wish you the best in your future endeavors!

BSBE

Acosta, Jeremy Jules
Cavalier, Maryn Bailey
Craven, John Bailey
DeSilva, Catherine Marie
Fuller, RaeDiance
Garcia, Brittany Claire
Hebert, Tyler Faye
Hutchins, Matthew Spencer
Khalif, Layah Ayana
Lam, Meggie
Lee, Alexander Francois
Lindsay, Athena Loren
Moldovan, Laura Alexandra
Opiri, Michelle Mulaa
Schmidt, Eva
Shanberg, Vincent Joseph
Veneracion, Kristen Michelle

MSBAE

Daniel, Dideolu Joshua
King, Connor Tuohy

PhD BE

Barekati Goudarzi, Mohamad

Distinguished Communicators

Congratulations to our Fall 2019 Distinguished Communicator, Layah Khalif.

Engaged Citizen Distinctions:

We are proud of the three Engaged Citizen Distinctions earned by Rae-Diance Fuller, Maryn Cavalier, and Layah Khalif!

Distinguished Researchers

Congratulations to Maryn Cavalier and Meggie Lam for being awarded the LSU Distinguished Undergraduate Researcher. This designation recognizes the achievements of outstanding undergraduates who participate in a track of educational and research activities leading to a final and public presentation or publication of a faculty-mentored undergraduate scholarly project. An LSU Distinguished Undergraduate Researcher is a student who has demonstrated outstanding ability as an advanced student researcher in their discipline. Distinguished Researchers will be honored at a special medal ceremony in their graduating semester and the designation will be noted on their transcripts.

Click here for more information.

Kodi Guillory, 2005 BSBE, Profiled in Greater Baton Rouge Business Report

3 things to know: Kodi Guillory

1. Before opening her civil engineering firm in April, Guillory had always dreamt of owning a company, building a career with both private industry and public sector experience (as a civil engineer at CDM Smith in Baton Rouge and an engineering supervisor at the Coastal Protection and Restoration Authority of Louisiana, respectively).

2. She wants to dispel any misconception that Sustainable Design Solutions exclusively deals with green infrastructure; for Guillory, “sustainable” means taking into account a client’s budget and existing resources in order to give them a project that lasts.

3. One leadership skill she’s learned the hard way: A strong leader is a patient leader—and the best ones know how to calmly navigate whichever clients, stakeholders or funding sources might be holding up a process.

Favorite things:

GuilloryFamily time
“Almost every ounce of free time I get is spent with my husband (David) and my sons (David Ryan, 4, and Matthew, 3).”

To-do lists
“I have one on my phone—it’s the first thing I check once my alarm goes off in the morning so that nothing falls through the cracks.”

Planetarium visits
“Up until I was 18, I always wanted to be an astronaut and the first person to visit Mars. Science and space are still things that interest me.”

Dinner for two
“On a date night, I enjoy the atmosphere at Fleming’s, as well as the ribeye and snow crab legs.”

Kids’ bops
“When I do listen to music, I’m generally in the car with my two boys and listening to a soundtrack from a movie they’ve seen. Some all-time favorites are The Greatest Showman and Despicable Me.”

The Art of Science: Gallery Showcases Cancer, Bacteria Designs by LSU BE Senior

The art of LSU Biological Engineering senior Meagan Moore was featured as part of “Metis-Muses: Women of Art Through Science” at The Healthcare Gallery and Spa in Baton Rouge through January 21.

As a BE student, Moore is known in the college for her design of “Marie,” a 3D-printed, 5-foot-1-inch purple model used for cancer radiation therapy research. The life-size “Marie” will be part of Moore’s art display, along with other pieces inspired by her cancer research. One work, called “Cancer Mandala,” features a smaller model of “Marie” in front of a mandala, a geometric figure representing the universe in Hindu and Buddhist symbolism. “Cancer Mandala” combines data Moore collected from the various particle accelerators used in her research with histological image samples of different types of cancer.

“Mandalas are made by monks to guide practitioners to enlightenment and are often painted, woven, made of sand, and sometimes 3D,” Moore said. “The destruction of the sand mandala is a highly ceremonial process, where the piece is parted out and released back into nature. Similarly, certain cancer treatments literally and metaphorically take a person apart or remove the cellular issues manifesting within the physical form.”

The outermost layers of the mandala include various graphs and functions that are utilized to propagate therapeutic beams and function as part of the “tool box” of a medical physicist. Moving inward, there are a series of concentric circles, based on data collected in Moore’s research, representing the regions of interest that were tested on the full-scale “Marie.” Starting from the outer four rings, the data for the thyroid is parted out, with each circle representing a different machine utilized to collect data and the amount of dose-per-dose gray done at varying field sizes. The innermost rings represent the breast/chest, pacemaker and fetus. The small model of “Marie” at the center was used in the prototyping process to design and build the full-scale model.

Another of Moore’s pieces, “Marine Snow: Diatons, Radiolarians, Dinoflagellates,” features resin and acrylic pieces designed to represent actual marine snow, a continuous lilt of organic material that falls from the upper surface waters of the ocean to the depths where this is little to no sunlight. Moore scanned electron microscopy images of diatoms, dinoflagellates and radiolarians to create this piece, which sits on a backlit box that provides color coding to gallery visitors.

Her “Apoptosis” piece “seeks to analyze the calculated death that cells can undergo,” Moore said. The central focus is an apoptosome, which is a large quaternary protein structure formed in the process of apoptosis, which is cell death. The circular facets of this mandala are composed of the genetic code of the apoptosome.

Other pieces by Moore include a Petri dish with images shaped out of bacteria, one of which is a bee called “The Most Important Species on Earth.”

“This piece focuses on bees, which were recently acknowledged to be the most important species on Earth,” Moore said. “I hope this piece will imbue a sense of the importance of ‘bee-ing’ rather than seeming and perhaps an enchanting notion to explore the worlds that make our very world exist.”

Moore credits Claire Luikart, Cathlin Disotell and Mary Miller for helping her with these pieces.

SENIOR GIFT CAMPAIGN

Through their gifts, donors to the 2019 Senior Gift Campaign planted their roots at LSU, made the campus experience even better for future Tigers, and set an example for those Tigers to give back, too. The Student Philanthropy Council chose to highlight the LSU Student Emergency Support Fund, which assists students who need immediate financial relief after storms, fires, family hardships, and other disasters.

SENIOR GIFT

256 STUDENTS (+16% FROM 2018) PARTICIPATED!

$2,979 contributed during the campaign

+76% dollar amount given

Top Funds Supported:

1. **Student Life Emergency Support Fund**
2. **College of Humanities & Social Sciences Excellence Fund**
3. **Veteran & Military Student Services Support Fund**

"The inspiration behind my gift is based upon my exceptional experience within my major. LSU's biological engineering department is a very close family atmosphere. I wanted to give something back to the second family I have acquired and will miss dearly after graduation."

Kerci Champagne (Engineering, '19)
Top 2019 Senior Gift Campaign Donor
Gift Supported the Student Life Emergency Support Fund

RESEARCH HIGHLIGHTS

BE Faculty, Students' Paper Published in ACS Publication

BE Assistant Professors Carlos Astete and Jangwook (Philip) Jung, BE graduate students Jorge Belgodere and Katie Hamel, and BE undergraduate student Syed Zamin were co-authors on a paper titled, *Modulating Mechanical Properties of Collagen-Lignin Composites*, which was published in the American Chemistry Society's publication, *ACS Applied Bio Materials*.

They were joined by fellow authors University of Kentucky Professor of Chemistry Bert Lynn, University of Kentucky Assistant Professor of Biosystems and Agricultural Engineering Jian Shi, University of Texas School of Engineering & Applied Science Assistant Professor Jai Rudra, University of Kentucky Graduate Research Assistant Ryan Kalinoski, and North Carolina State graduate student Joseph Penrod.

Abstract

Three-dimensional matrices of collagen type I (Col I) are widely used in tissue engineering applications for its abundance in many tissues, bioactivity with many cell types, and excellent biocompatibility. Inspired by the structural role of lignin in a plant tissue, the group found that sodium lignosulfonate (SLS) and an alkali-extracted lignin from switchgrass (SG) increased the stiffness of Col I gels. SLS and SG enhanced the stiffness of Col I gels from 52 to 670 Pa and 52 to 320 Pa, respectively, and attenuated shear-thinning properties, with the formulation of 1.8 mg/mL Col I and 5.0 mg/mL SLS or SG. In 2D cultures, the cytotoxicity of collagen–SLS to adipose-derived stromal cells was not observed and the cell viability was maintained over seven days in 3D cultures. Collagen–SLS composites did not elicit immunogenicity when compared to SLS-only groups. The group"s collagen–SLS composites present a case that exploits lignins as an enhancer of mechanical properties of Col I without adverse cytotoxicity and immunogenicity for in vitro scaffolds or in vivo tissue repairs.

Read the full paper here.

Belgodere Places First at APTEC Meeting

Jorge Belgodere, a PhD student under Assistant Professor Jangwook (Philip) Jung, finished in a three-way tie for first place in the poster competition at the Applied Polymer Technology Extension Consortium Annual Meeting held at LSU. Belgodere's poster topic was *Chemoselective Ligation of Thiolated Sodium Lignosulfonate*.

Dr. Elizabeth Martin and her graduate student, Ethan Byrne, won a grant

LSU Biological Engineering Assistant Professor Elizabeth Martin and LSU School of Medicine in New Orleans Associate Professor Frank Lau were recently awarded a $100,000 internal grant for a study on how the obese tissue environment alters response to breast cancer therapy.

Louisiana has the third-highest female breast cancer death rate in the United States and was ranked as having one of the highest obesity rates in 2018, statistics that prompted Lau and Martin to research whether obesity creates a tumor environment that supports chemotherapy resistance in breast cancer patients.

Martin has worked on breast cancer research at LSU for the past four years, so it made sense for her to pair up with Lau, a clinical surgeon, who is an expert in adipose (fatty) tissue. Lau developed a method to culture white adipose tissue while Martin and her students work with Lau to insert breast cancer cells and evaluate how the tissue environment is remodeled.

"One of the reasons breast cancer is so hard to treat is there are many different components to the stromal environment, which makes it tricky to identify how a patient will respond to therapy," Martin said.

There are many factors that can alter responsive therapy to breast cancer, such as race, age, and obesity, which is the area Martin and her team are choosing to focus on. Compared to lean tissue, obese tissue has more inflammation and higher levels of collagen deposits, which can lead to fibrosis. Martin wants to discover if a collagen-rich environment makes breast cancer more aggressive.

"Studies have shown that breast cancer cells growing in a lab become more aggressive if they are on a stiff collagen-dense tissue matrix," she said. "So, we want to see if it correlates in real tissues."

Martin's team, made up of LSU BE PhD candidate Ethan Byrne and LSU BE undergraduates Morgan Doyle and Janusz Wojcik, will compare samples of lean and obese tissue to compare how the breast cancer cells behave in each one.

"What we think is happening is that when a tumor develops, the cells start invading tissue," Byrne said. "The cells then degrade the tissue and as they're taking it down, replace it with something that better suits them. They will also induce the cells around them to start changing the collagen content. The cells then start controlling everything."

Byrne, who has worked with cancer cells in Martin's lab for the past two summers, also trained in Lau's lab last summer.

"They are culturing human breast tissue in between sheets of stem cells that anchor tissue down and allow for long-term growth in culture," Byrne said. "Once the samples have been collected, we decellularize the samples and look at the fine microstructures and how they're remodeled during tumor progression."

Though a cure for breast cancer has yet to be found, the quest for more informed treatment options based on understanding the tissue environment of a tumor lives on through Martin and Lau's research.

"This model allows us to more personalize our understanding of breast cancer drug resistance," Martin said.

Jung, Belgodere Publish in *Marcromolecular Rapid Communications*

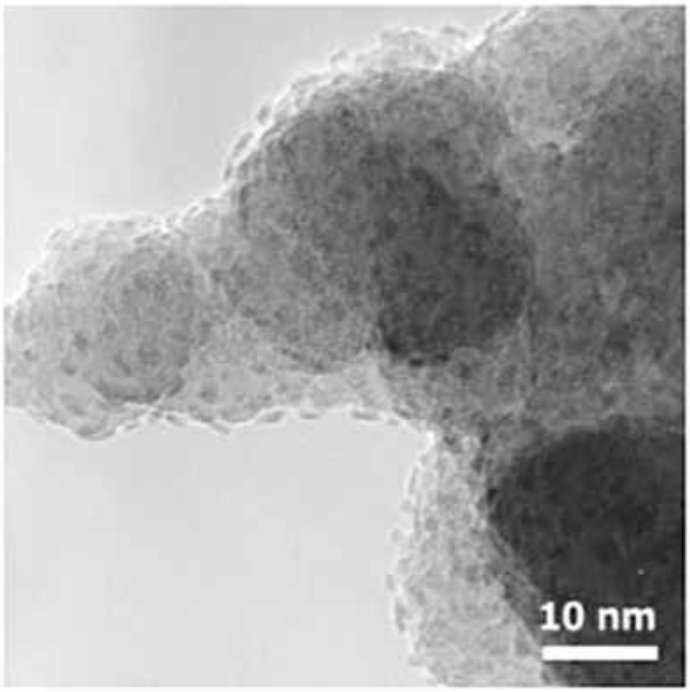
BE Assistant Professor Jangwook (Philip) Jung, BE graduate student Jorge Belgodere, Chemical Engineering PhD students Yusheng Guo and Yingzhen Ma, and Chemical Engineering Professor Bhuvnesh Bharti, were recently published in the journal *Macromolecular Rapid Communications*. Their article, entitled *Directed Printing and Reconfiguration of Thermo-responsive Silica-pNIPAM Nanocomposites*, was selected for the coveted space of front cover.

Abstract

Printing of polymeric composites into desired patterns and shapes has revolutionized small scale manufacturing processes. However, high resolution printing of adaptive materials that change shape in response to external stimuli remains a significant technical challenge. The article presents a new approach of printing thermo-responsive poly(*N*-isopropylacrylamide) into macroscopic structures that dynamically reconfigure in response to heating and cooling cycles. The printing process is performed using an external laser source, which enables thermal cross-linking of the polymer ink consisting of monomer, cross-linker, initiator, and inorganic nanoparticles. It is shown that the addition of silica nanoparticles enhances the mechanical properties of poly(*N*-isopropylacrylamide) while maintaining its thermo-responsiveness at micrometer-scale resolution, which otherwise is not feasible by extrusion-based three-dimensional printing techniques. It is demonstrated that spatial reconfiguration of the printed monolayers upon increasing temperature is governed by the local geometry, which enables mimicking the reconfiguration of plant leaves in a natural environment. The study lays a foundation for developing a new fabrication platform to print thermo-responsive structures that may find applications in biomedical implants, sensors, and other multi-responsive materials.

Read the full paper here.

Improving Pesticide Use With Nanotechnology



On a recent episode of *Nano Matters*, LSU Biological Engineering Professor Cristina Sabliov explained how nanotechnology can improve pesticide delivery. She also discussed her work on a polymeric nanoparticle delivery system that could reduce the environmental impact of pesticides. The USDA's National Institute of Food and Agriculture was instrumental in developing the research outlined in this podcast.

Listen to the NanoTube broadcast.