

UCF

**MSE FACULTY RESEARCH
IN HIGH IMPACT JOURNALS
MAY 2019 - MAY 2020**

JOURNAL ARTICLES: 103
CONFERENCE PROCEEDINGS: 32
BOOK CHAPTERS 3
EDITED BOOK 1

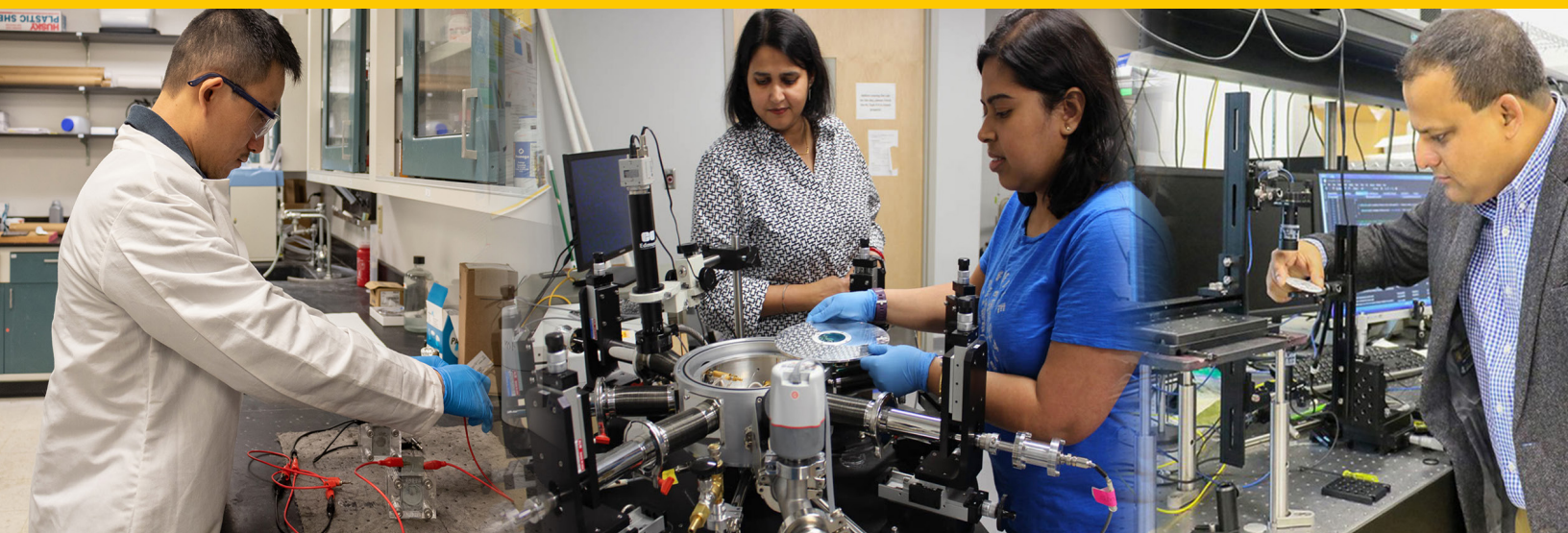
UNIVERSITY OF CENTRAL FLORIDA

MATERIALS SCIENCE AND ENGINEERING DEPARTMENT

Fall 2020

mse.ucf.edu
ampac.ucf.edu

Newsletter





Dear Friends and Alumni:

First and foremost, I wish you and your family the very best health during this COVID 19 pandemic. While COVID 19 has caused worldwide disruption, but it has brought the best out of the humanity to help each other in this ever-challenging time.

We are very proud of faculty, staff and students to adjust this new normal in teaching, research and service. While it is hard work, but we have learned a lot from each other. While working

remotely at times, our productivity remained high and we have become more innovative.

UCF continues to strive in winning a record number of NSF CAREER awards. Congratulations to our three new MSE Program faculty CAREER award winners. Energy research from our faculty was highlighted in high impact journals, cover articles and a CAREER award. We are delighted our faculty, students and staff were honored at UCF and won national and international awards.

Our MSE undergraduate program is now approved by Florida Board of Governors this Spring'20. My sincere gratitude to faculty, staff and administrators, who helped and supported this endeavor along the way.

Through this newsletter, I would also like to reach out to our wonderful alumni and friends to share your stories and accomplishments. Your generous support for the growth of our Department will be greatly appreciated (<https://www.ucffoundation.org/givetocsecs>).

I would like to propose that even if Covid 19 shadows our daily life now, let's make this academic year 2020-2021 the best ever for MSE.

I wish you all a productive year ahead !!

Stay safe and well. Go Knights!

Sincerely

Sudipta Seal, Ph.D.

Trustee Chair, University Distinguished Professor and Pegasus Professor
Chair, Materials Science and Engineering, CECS



MSE UNDERGRADUATE PROGRAM

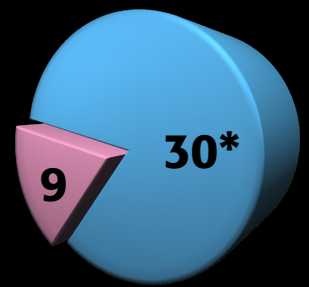
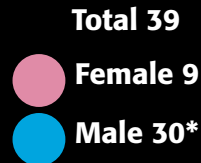
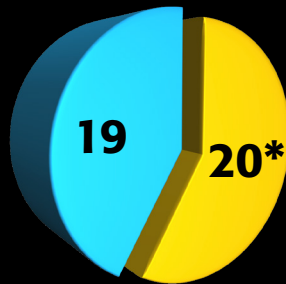
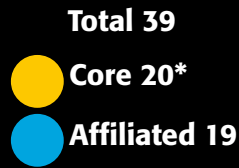
New Bachelor's Degree in Materials Science and Engineering to Begin in Fall

Graduates of the new degree are sought by employers in a wide variety of high-tech industries such as space, defense, electronics, energy and medicine. UCF is one of only two universities in the state to offer the MSE major. The bachelor's degree, approved earlier this year by the Florida Board of Governors, expands the degree offerings of UCF's nationally-ranked Department of Materials Science and Engineering, which also offers a master's degree and a doctoral degree program.

"This is a great addition to our repertoire of outstanding engineering programs and is very timely," says **Manoj Chopra**, associate dean for Academic Affairs in the College of Engineering and Computer Science. "MSE has applications ranging from biomaterials and nanotechnology on the one hand, to construction materials on the other."

The 128-credit hour degree requirements include classes in chemistry, physics, and intensive study of the properties of materials. Classes for the new bachelor's degree program are scheduled to begin August 2020 at the start of the fall semester. Students may choose the MSE major after completing general engineering courses and prerequisites.

FACULTY DEMOGRAPHICS



* (includes 2 lecturers)

STUDENT DEMOGRAPHICS

MS Students

Total: 27
Male: 13
Female: 14
URM*: 6

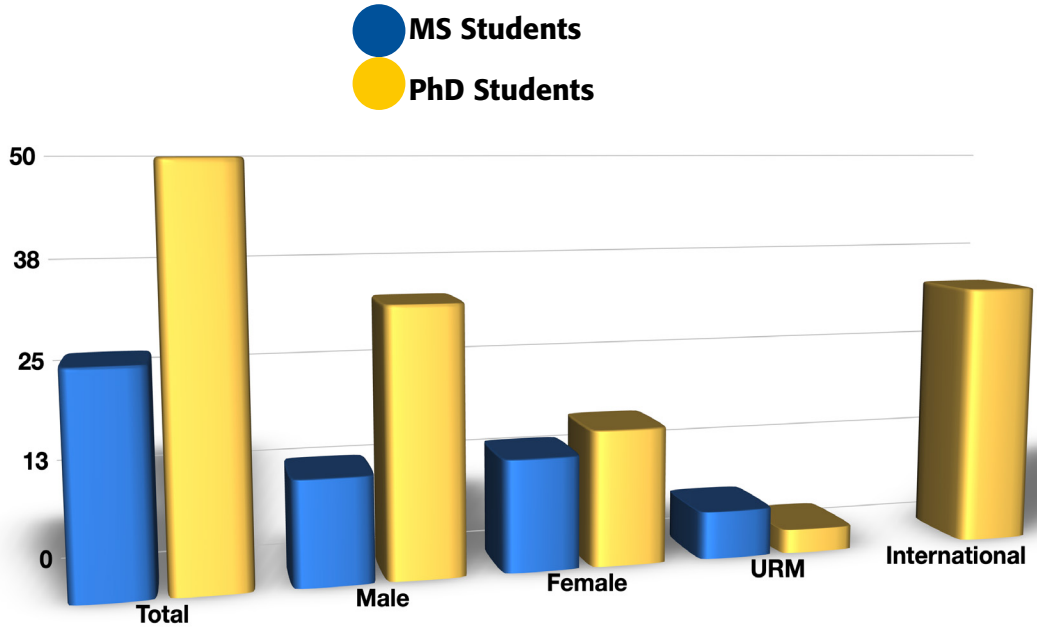
PhD Students

Total: 50
Male: 33
Female: 17
URM*: 3
International: 33

*Under Represented Minority

Degrees (Past three years)

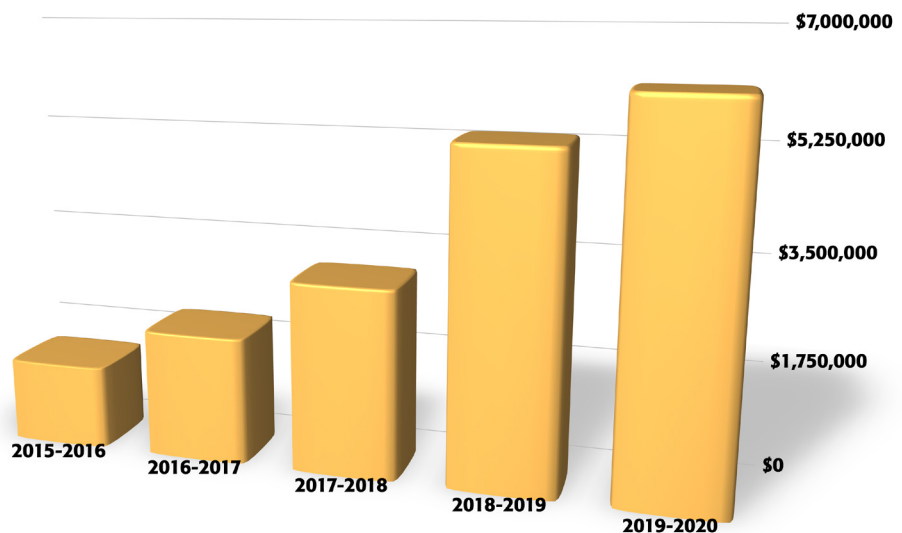
2017/2018
PhD: 5
MS: 8
2018/2019
PhD: 8
MS: 4
2019/2020
PhD: 2
MS: 9



STEADY INCREASE MSE RESEARCH FUNDING

The Material Science and Engineering Department shows a steady increase in research funding in the past five years.

2015-2016 - \$1,373,031
2016-2017 - \$2,086,592
2017-2018 - \$3,084,647
2018-2019 - \$5,346,450
2019-2020 - \$6,136,089



MSE AT A GLANCE

Three MSE Program Faculty Receive NSF CAREER Award

Dr. Ellen Hyeran Kang, Dr. Xiaofeng Feng, Dr. Akihiro Kushima – Congratulations!!



Dr. Ellen Hyeran Kang



Dr. Xiaofeng Feng



Dr. Akihiro Kushima

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Dr. Akihiro Kushima NSF Career Award on Solid State Battery Research

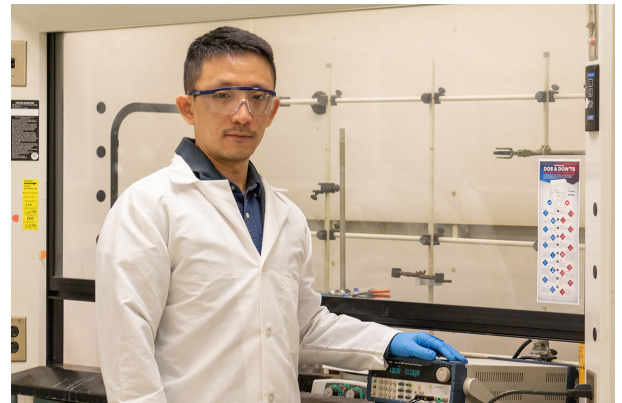
Dr. Kushima’s program will focus on understanding the fundamental reaction mechanisms in all-solid-state batteries to identify the root causes of the failures at the electrochemical interfaces. He will develop a novel in-situ transmission electron microscopy technique that enables precise evaluation of the interplay between the strain/stress evolutions and the changes in the microstructure/chemistry at the interface during electrochemical reactions in atomic- and nano-scales. His study will contribute to the development of advanced energy storage devices beyond current Li-ion battery technologies.

UCF Researcher Works to Make Safer Electric Vehicles

The key to the safer fuel cells is the use of platinum; however, the high cost of the precious metal has kept the technology too expensive. This is a problem Yang has worked to overcome.

Dr. Yang Yang is working to create fuel cells that could lead to safer electric cars that can travel longer distances.

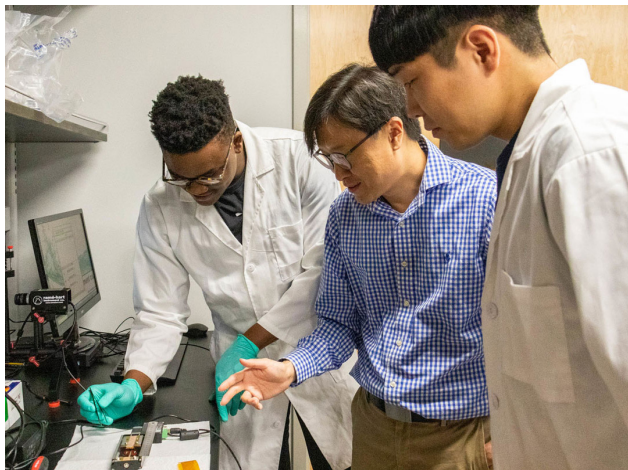
Electric cars are a low-emission alternative to combustion engines; however, their lithium-based batteries can catch fire, thus posing a safety threat that limits the technology. A University of Central Florida researcher is working to overcome that problem by designing fuel cells that are safer, more powerful and less expensive. The work is detailed in a new study published in the journal [Angewandte Chemie](#).



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Researchers Make Super Stretchable E-Material Using Kirigami, Nanotechnology

By combining the ancient Japanese art of paper cutting with science, this new material could have applications ranging from smart jackets to solar cells.



Dr. Yeonwoong Jung, an assistant professor in UCF’s Department of Materials Science and Engineering/NSTC conceived of the new technique that’s combining art and engineering. He works with students and colleagues in his lab.

By combining the ancient Japanese art of paper cutting with nanotechnology, the University of Central Florida researchers have created a super flexible electronic material that could have applications in products ranging from smart jackets to solar cells.

“Connecting this idea, using kirigami for strain engineering with the nanomaterial we’ve created, this is entirely novel,” says Yeonwoong Jung, an assistant professor in UCF’s Department of Materials Science and Engineering who conceived of the new technique that’s combining art and engineering.

[Read More](#)

UCF, IMEC Developing Sensor to Detect Fires Remotely

The sensor will use terahertz waves to detect fire and chemicals whose unique molecular signatures can be determined based on how the waves interact with them.

Dr. Kausik Mukhopadhyay, a senior lecturer and researcher at UCF's Department of Materials Science and Engineering, is working to develop a sensor that remotely detects fires and dangerous chemicals.

The U.S. Department of Homeland Security is turning to the University of Central Florida to develop new technology to help keep first responders safe during potentially toxic fires.

It's doing so with a new, \$500,000 grant from the department's Federal Emergency Management Agency, which will fund the development of a sensor that remotely detects fires and dangerous chemicals. It is the first FEMA fire prevention and safety grant UCF has received.



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[Orlando Sentinel](#)

UCF FSEC's Fenton on the news Experts: Solar energy offering cheaper, cleaner energy alternative for Floridians



"I envision that we'll have this building here where we're at right now covered with solar on the roof, my employees will all drive into work in their electric cars, they'll fill them full of solar electrons while making plenty, then they'll drive their car home, they'll plug it into the wall and the house will steal electricity from the car and turn on the air conditioner that they just turned on," MSE Professor Dr. Fenton said.

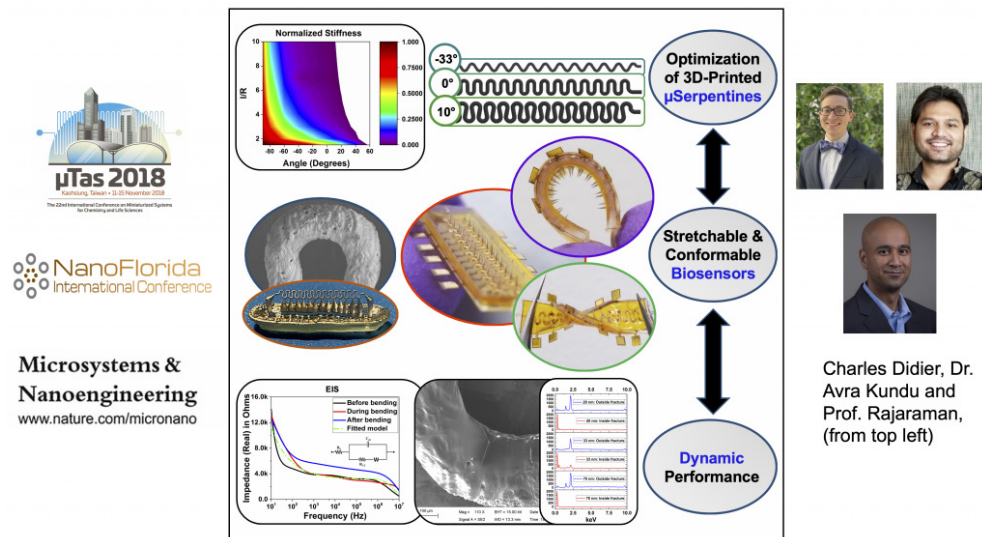
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[WESH2 News](#)

"Dynamic 3D Microelectrodes" just got published in the Nature Microsystems and Nanoengineering

Wearables: Stretchable microstructures for microelectrode sensors

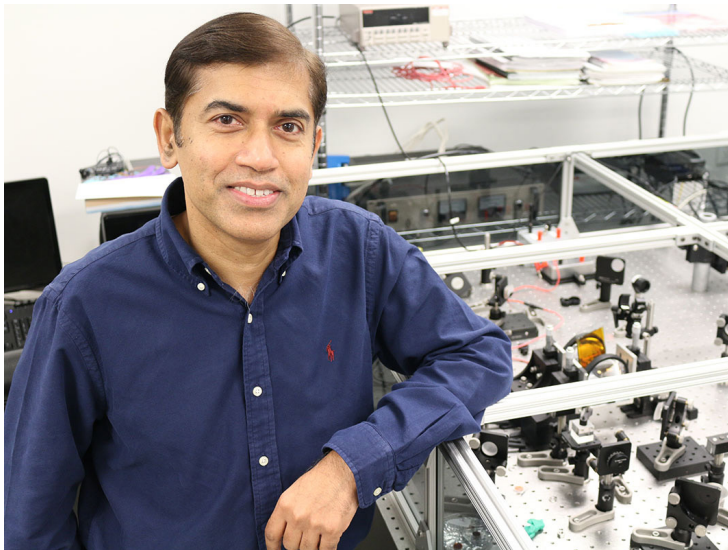
Dr. Swaminathan Rajaraman (MSE/NSTC) and team developed an unique method to make wearable electronics using flexible microstructures have been explored and characterized by researchers in the United States. Wearable devices such as sensors or power generators require stable, stretchable electronics, otherwise, their electrical performance will degrade when they are deformed. The work was published in the prestigious Microsystems and NanoEngineering journal on April 20, 2020. (Nature Publication) It is also the subject of a US Patent application.

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Artificial Intelligence May Help Scientists Make Spray-on Solar Cells

UCF researchers have developed an AI system that can identify formulas for creating liquid solar cells, which potentially could allow them to be painted on bridges, houses, and skyscrapers.

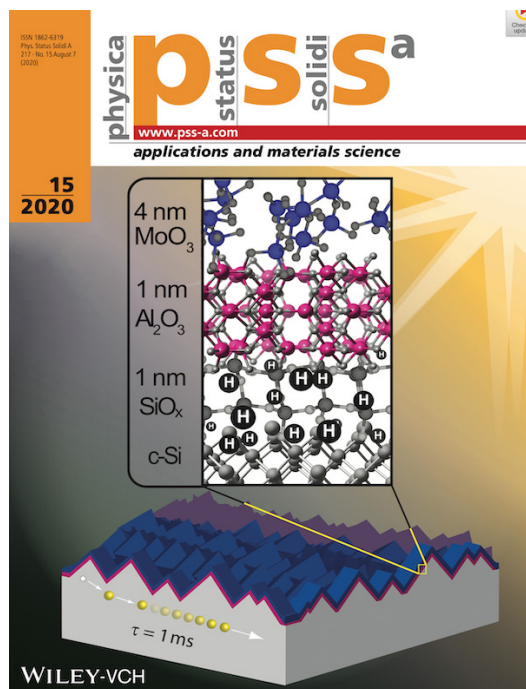


A research team by **Prof. Thomas** at the University of Central Florida used Machine Learning, aka Artificial Intelligence to optimize the materials used to make perovskite solar cells (PSC). The Organic-Inorganic halide perovskites material used in PSC converts photovoltaic power into consumable energy. The team's work is so promising that its findings are the cover story Friday, Dec. 13 in the Advanced Energy Materials journal.

[Read More](#)

Prof. Fang's Research Featured on the Cover of the Journal of Physical Chemistry and Journal of Materials Chemistry

Prof. Fang's research on the design and synthesis of stimuli-responsive supramolecular assemblies for biosensing and drug delivery is recently featured on the cover of the Journal of Physical Chemistry and Journal of Materials Chemistry.



MSE Research on Solar Energy Technologies Featured on the Cover of physica status solidi (a)

Research from the MSE and Chemistry departments at UCF has been featured on the cover of physica status solidi (a).

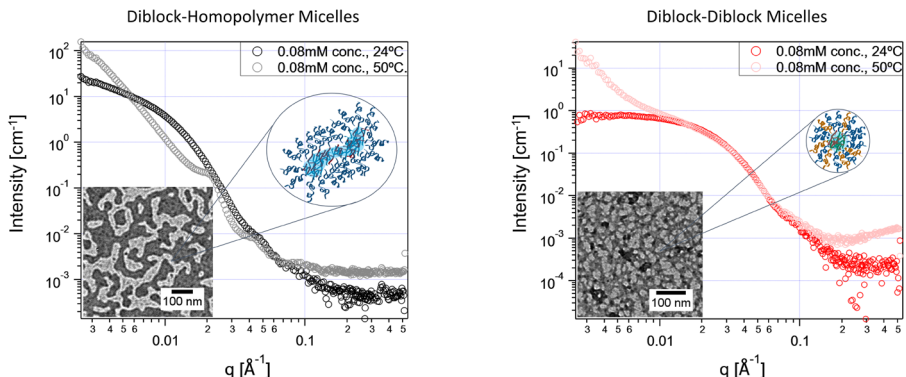
Led by **Prof. Kristopher O. Davis** (Assistant Professor, MSE and RISES Cluster), this work was carried out by **Geoffrey Gregory** (Graduate Student, MSE), **Corbin Feit** (Graduate Student, MSE), **Zhengning Gao** (Postdoctoral Researcher, MSE), **Prof. Parag Banerjee** (Associate Professor, MSE and REACT Cluster), and **Prof. Titel Jurca** (Assistant Professor, Chemistry and REACT Cluster).

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Lorraine Leon, Ph.D. has Been Selected as a 2019 Emerging Investigator by the Journal of Materials Chemistry B

Dr. Lorraine Leon (Assistant Prof, MSE) and her student, Sachit Shah, published a paper for this special issue: <https://pubs.rsc.org/en/journals/articlecollectionlanding?sercode=tb&themeid=880888f9-e71f-4dcc-bfdb-ff54cf2776ff>

Structural transitions and encapsulation selectivity of thermoresponsive polyelectrolyte complex micelles. The actual article landing page is here: <https://pubs.rsc.org/en/content/articlelanding/2019/tb/c9tb01194c#!divAbstract>



Polyelectrolyte complex micelles containing thermoresponsive coronas can exhibit varying morphologies and encapsulate multivalently charged therapeutics for drug delivery applications.

Graphical abstract: Structural transitions and encapsulation selectivity of thermoresponsive polyelectrolyte complex micelles

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Prof. Yongho Sohn inducted into the UCF Scroll & Quill Society

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Congratulations to Prof. Fang!

9 Luminary Award Recipients Honored for Making an Impact on the World

The Luminary Award recognizes researchers for being academic leaders making an impact on the world through their studies and scholarship. The University of Central Florida honored nine outstanding faculty members during the third annual Luminary Awards Celebration.

Prof. Jiyu Fang, College of Engineering and Computer Science (AMPAC/MSE) Fang's research focuses on the interdisciplinary areas of physics, chemistry, materials and biology, to study self-organized and stimuli response soft matter. His work is highly cited by others in his field. His expertise has led him to develop liquid crystal-based optical sensors, which can be used for the simple, fast and sensitive detection of the biomarkers of diseases and the bacteria responsible for tuberculosis.

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[More](#)

UCF Engineering Chair Named Fellow of Royal Society of Chemistry

Prof. Sudipta Seal, an engineering professor and chair of UCF's Department of Materials Science and Engineering, has been named a fellow of the Royal Society of Chemistry, one of the oldest chemical societies in the world.

"Getting recognized by the Royal Society of Chemistry is not only a humbling experience but will also create a lot of future research opportunities," Seal says.

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Prof. Seal Receives the Albert Sauveur Achievement Award from American Society of Materials (ASM Intl)

[Read More](#)

Engineer Named National Fellow for Work in Materials Science

Prof. Sudipta Seal is one of 23 fellows of American Ceramic Society recognized for his contributions which have impacted the area of space, medicine and the environment.

[Read More](#)

UCF Scientists Seek Novel Material to Kill COVID-19

Backed by the National Science Foundation, researchers are working on developing a nanoparticle film that would “catch” and kill viruses to better protect healthcare providers.



Scientists from two disciplines join forces to help healthcare providers protect themselves from COVID-19.

Masks that protect doctors and nurses from COVID-19 only block the virus before it reaches their faces, but UCF researchers are working to create a protective coating that would include a novel mask material that would catch the virus and kill it within seconds.

Prof. Sudipta Seal, an engineer specializing in material science and nanotechnology, initiated this project working with **Prof. Griffith Parks**, a virologist who leads research efforts at UCF’s College of Medicine. Funded by the National Science Foundation

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MSE Faculty Delivers Remote Lab Instruction using Innovative and Resourceful Approach

UCF Faculty, Students Get Creative to Finish Unprecedented Semester

As the spring semester nears its end, here’s a look at some of the resourceful ways students and faculty have adapted to online learning.

Dissecting honeybees via Zoom, using a glass shower door as a whiteboard and creating a virtual art gallery are a few of the ways students and faculty have adapted to remote learning, which UCF transitioned to on March 18 due to the COVID-19 pandemic.

To help faculty and students with the transition, UCF rolled out new websites with specialized resources, such as Keep Teaching for faculty and Keep Learning for students, and held a series of training workshops on effective online learning.

Dr. Kausik Mukhopadhyay of MSE is teaching a MSE Lab online.

Even prior to the pandemic, the university has been considered a national leader in online learning. For the last three years, U.S. News & World Report has ranked UCF in the top 20 for online bachelor’s programs. In 2019, the National Center for Academic Transformation (NCAT) – a leader in course redesign and online learning for nearly 20 years – selected UCF to maintain its entire collection of resources because of its strong online learning program and commitment to affordable education



Featured in UCF News: <https://tinyurl.com/yb5ohw7t>

Other COVID related research

[UCF Researchers are Helping Develop Rapid, Longer Lasting COVID Disinfectant](#)

[UCF AI/ML grant for COVID 19 Research - An Interdisciplinary Collaboration](#)

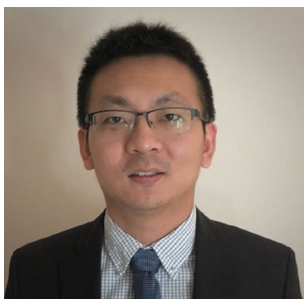
ALUMNI NEWS

Congratulations!! To Dr Catherine Kammerer ‘13 M.S., MSE; ‘15 Ph.D., MSE (Advisor: Prof. Sohn)

Catherine “Cathy” Kammerer, Ph.D., is a Senior Engineering Manager at Aerojet Rocketdyne, West Palm Beach, Florida. She provides materials characterization, process development, manufacturing, and other design support functions of rocket engines by developing innovative materials and process solutions to meet the performance needs of space flight.



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Dr. Le Zhou, Accepts Assistant Professorship ‘16 Ph.D., MSE (Advisor: Prof. Sohn)

Dr. Le Zhou, who has been a familiar face around UCF MSE, will be leaving UCF to embark on the next career challenge, namely a tenure-track assistant professor at Marquette University in Milwaukee, Wisconsin. Dr. Le Zhou earned his B.S. degree in materials science and engineering from the Beihang University in 2010, and came to UCF to earn his Ph.D. in Materials Science and Engineering from University of Central Florida in 2016 under the supervision of Dr. Yongho Sohn.

Omar Ahmed Runner Up at UCF 3MT Research Competition

Winners from the Three Minute Thesis (3MT) competition are invited to compete at the state competition on April 15, in the 2020 Conference of Florida Graduate Schools at UCF.

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MSE Student Received the UCF Graduate Dean’s Dissertation Completion Fellowship



MSE Ph.D. student Aadithya Jeyaranjan has been awarded the UCF Graduate Dean’s Dissertation Completion Fellowship. This fellowship provides a stipend of \$10,000, tuition support, and health insurance for Spring 2020.

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Congratulations Sharon Park '19, Materials Science and Engineering for Order of Pegasus Award



UCF’s most prestigious student award is based on academic achievement, university involvement, leadership and community service. Twenty-four students – ranging in disciplines from engineering to biology to education and more – have been named as 2020 recipients of the Order of Pegasus, UCF’s most prestigious student award.

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Deepak Pandey, Ph.D. Scholar, Received “Young Researcher Award” at ICNAN’2019

His Research and Oral Presentation were based upon the development of an “Ultra Long life Supercapacitors fabricated using vertically aligned graphene on carbon fibers.”

[Read More](#)



Congratulations:
Emmanuel Okogbue
 (Advisor: E. Jung)
Mark Schnepfer
 (Advisor: J. Hickman)

North American Materials Colloquium Series: MSE – UCF

MSE Undergraduate Student Interdisciplinary Research Experience: Derek Saltzman (MSE UG Student)

From Derek: “I was involved in composites research (Advisor Dr. Gao) and my team went through the UCF NSF ICORE program to go through their Customer discovery program which gave us great insight on our products fit in the market. Once complicating that my cofounder and i competed in UCF social venture competition where we placed second and won \$1200 in operation capital. It’s been a fun up and down roller coaster over the years so i thought i would share my story.

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Congratulations to Kari, Jodi, Sandy and Angie



Congratulations to Kari, Jodi, Sandy, Angie for their 30, 5, 5, 20 yrs great service, and their contribution to AMPAC and MSE department

UCF Chapter of AVS visits ANCORP

On Jan 21, 2020, members of the UCF chapter of AVS, composed of students from MSE, Chemistry, and Physics, attended a high vacuum demonstration and tour at ANCORP in nearby Williston, FL.

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Congratulations to Dr. Kramer – Member of the MSE Industrial Advisory Board

Announcing the 2020 Class of Florida Hall of Fame Inventors! For the full biographies of 2020 Inductees, please visit the [Florida Inventors website](#).

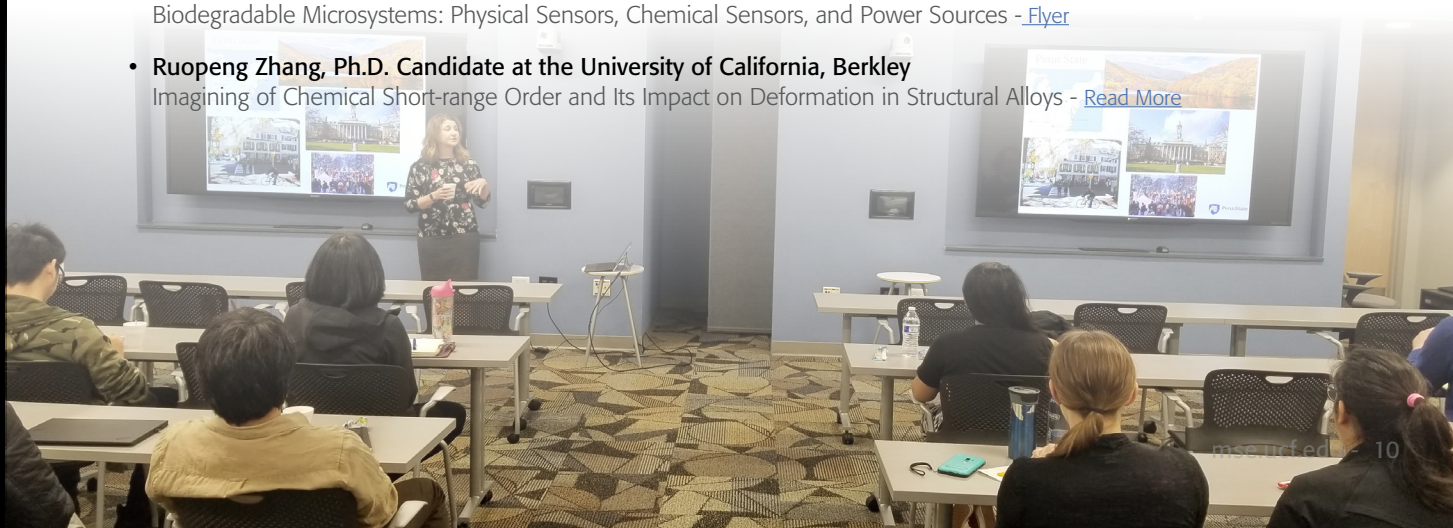
Congratulations to Pamela Ross – Employee of the Semester

Dr. Seal: "Pamela is an integral part of the MSE education program forward in the 21st century..."

MSE Distinguished Seminar Series

This year we were pleased to continue to host the MSE Distinguished Seminar Series. Our students, faculty, and community enjoyed seminars from the following presenters:

- **Amit Goyal, Ph.D. SUNY Empire Innovation Professor, University at Buffalo**
High-performance, heteroepitaxial, device layers on single-crystal- like, artificial substrates and controlled self-assembly of nanostructures within device layers for wide-ranging electrical & electronic applications - [Flyer](#)
- **Susan Sinnott, Ph.D., Department Head, Materials Science and Engineering Professor, Materials Science and Engineering and Chemistry**
Classical Atomic-scale Methods in Material Design and Discovery - [Flyer](#)
- **Mark Allen, Ph.D., Alfred Fitler Moore Professor, Electrical and Systems Engineering (ESE), Mechanical Engineering and Applied Mechanics (MEAM)**
Biodegradable Microsystems: Physical Sensors, Chemical Sensors, and Power Sources - [Flyer](#)
- **Ruopeng Zhang, Ph.D. Candidate at the University of California, Berkley**
Imaging of Chemical Short-range Order and Its Impact on Deformation in Structural Alloys - [Read More](#)





University of Central Florida

College of Engineering and Computer Science
Department of Materials Science and Engineering

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PROF. SUDIPTA SEAL

Department Chair

Materials Science and Engineering
Sudipta.Seal@ucf.edu, 407 823 5277

"This past year, Materials Science and Engineering started a new undergraduate program. This is exciting, knowing that this the first undergraduate program introduced by the College of Engineering and Computer Science in the last ten years, and also knowing that this only the second such degree in the State of Florida. This new undergraduate program will be delivered by more than 20 quality faculty in the MSE Department, a good number of whom are outstanding junior faculty, hired in the last 5 years, that complement the expertise of exceptional senior faculty that comprised the founding faculty members of a newly created MSE Department back in 2012. The undergraduate students that would matriculate in the MSE undergraduate program are expected to be drawn from a diverse pool of students that come to UCF and some of them are expected to pursue, upon graduation, advanced degrees in the MSE Department. The MSE Department has an established reputation of delivering graduate education to its students (ranked in the top 50 of Graduate Schools in this discipline according to the most recent US News and World Report ranking)."

*Michael Georgiopoulos, Ph.D., Dean
College of Engineering and Computer Science.*



Donate to MSE today at UCFfoundation.org