



UCF

**MSE FACULTY RESEARCH
IN HIGH IMPACT JOURNALS
MAY 2018 - MAY 2019**

**BOOK CHAPTERS: 3
JOURNAL ARTICLES: 118
CONFERENCE PROCEEDINGS: 25**

UNIVERSITY OF CENTRAL FLORIDA

MATERIALS SCIENCE AND ENGINEERING DEPARTMENT

Newsletter

Fall 2019

mse.ucf.edu
ampac.ucf.edu





Dear Friends and Alumni:

It gives me great pleasure to share exciting news from our growing MSE department and program.

Congratulations to our two new CAREER award winners who are MSE program faculty. The award will fund Prof Tania Roy's research on artificial neurons and synapses. She and her research team are developing them using two-dimensional graphene heterostructures for neuromorphic computing. Prof Laurene Tetard's awards will help to develop an instrument for plasmonic-assisted nanomechanical detection for polarized spectroscopy and imaging. For the first time at UCF, Prof Feng wins the SLOAN foundation fellowship for his groundbreaking work in electro catalysis.

We have also seen an increase in our graduate enrollment and external research funding. Innovative research in catalysis, biomaterials, 2D hetero-semiconductor materials are highlighted in this issue. Many of them have appeared in the cover page of high impact journals. I am also very proud of our amazing graduate students. They continue to excel in academics, research, administration winning prestigious awards (Goldwater, Trustee, etc.), and serving on Board of Trustees as a student member.

Our MSE undergraduate program is finally approved by UCF Board of Trustees and pending approval from Board of Governors. This is a huge step forward for MSE department at UCF and my sincere congratulations to faculty, staff and administrators, who helped and supported 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. MSE alumni are creating impact in not only industry, but also advancing their career to new heights. Your generous support for the growth of our Department will be greatly appreciated (<https://www.ucffoundation.org/givetocecs>)

I would like to thank each one of you for your continued support and inspiration. I wish you all a productive year ahead!! Come and visit us in Orlando – The City Beautiful. Go Knights!

Sincerely

Sudipta Seal, Ph.D.

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

UCF - THE POWER OF POTENTIAL



UNIVERSITY OF CENTRAL FLORIDA

Materials Science and Engineering

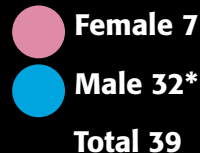
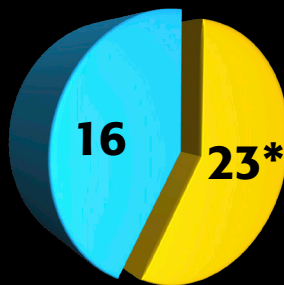
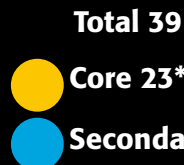
**NEW
BACHELOR'S
DEGREE**



MSE UNDERGRADUATE PROGRAM UPDATE

UCF is set to offer a new bachelor's degree in materials science and engineering, pending approval from BOG, to help graduates find jobs in fields as wide ranging as space, defense, electronics, energy and biomedicine. Materials, obviously, are at the core of all things engineered, and this new undergraduate program will be designed to meet the 21st century needs of the industry. MSE students will learn not only through challenging coursework, but alongside mentors in hands-on research projects that offer real-world experience. Because of the interdisciplinary nature of MSE, the new coursework combines engineering, physics and chemistry to design and manufacture materials that all other engineering fields require.

FACULTY DEMOGRAPHICS



* (includes 2 lecturers)

STUDENT DEMOGRAPHICS

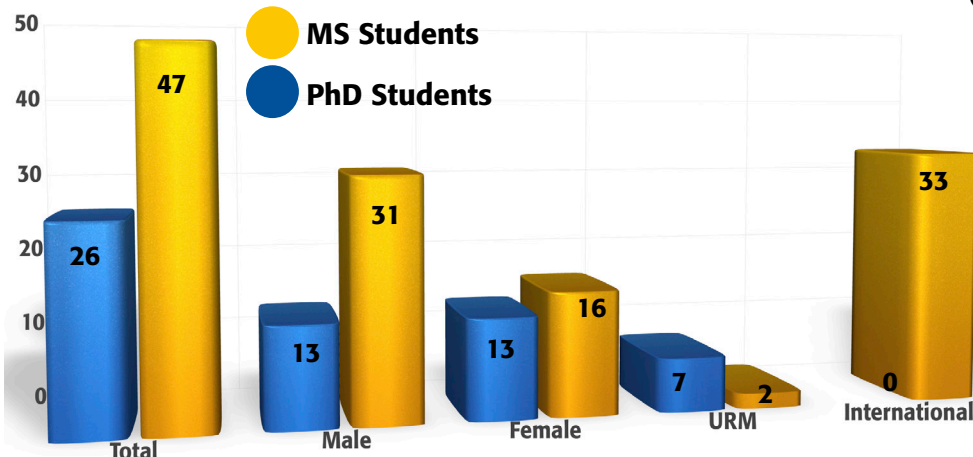
MS Students

Total: 26
Male: 13
Female: 13
URM*: 7

PhD Students

Total: 47
Male: 31
Female: 16
URM*: 2
International: 33

*Under Represented Minority



Degrees (Past three years)

2016/2017
PhD: 15
MS: 6
2017/2018
PhD: 5
MS: 8
2018/2019
PhD: 8
MS: 4

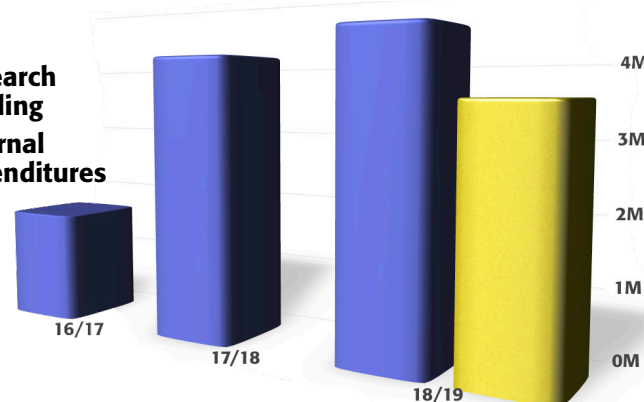
RESEARCH FUNDING (past three years)

Research Funding

2016/2017- \$1,673,072
2017/2018- \$4,164,238
2018/2019- \$4,530,985

External Expenditures

2018/2019- \$3,570,456



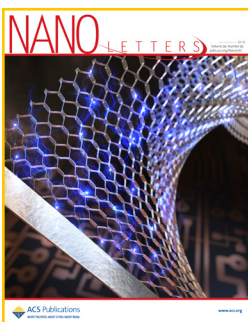
FACULTY IN THE NEWS

UCF Researchers Working to Reduce Infections in Diabetes-Treatment Device

Dr. Elizabeth Brisbois has received a \$400,000 grant from JDRF, formerly the Juvenile Diabetes Research Foundation, to create a cannula with a coating that resists infection and encapsulation. The coating has proved successful in the lab, and the new grant will help fund how well the coatings will work on cannulas used in living systems. Hitesh Handa with the University of Georgia is collaborating with Brisbois on the research. UCF graduate students Manjot Kaur Chug and Corbin Feit are also assisting. If the coatings prove successful, eventually they will be tested in humans.

Florczyk Lab demonstrates biomaterial scaffolds distinguish prostate cancer phenotypes.

Their results indicate that the chitosan-alginate scaffolds can promote different responses from cell lines with different phenotypes. The researchers are utilizing the findings of this study to design new scaffold compositions to further enhance the cell-material interaction of cancer cells with the scaffolds. The study is a collaboration between MSE, UCF Burnett School of Biomedical Sciences and Mayo Clinic. Published in Xu K, Ganapathy K, Andl T, Wang Z, Copland JA, Chakrabarti R, Florczyk SJ, "3D porous chitosan-alginate scaffold stiffness promotes differential responses in prostate cancer cell lines." Biomaterials, 217, 119311, (2019), an high impact journal.



Prof. Jung's breakthrough 2D materials' research in Nanoletters Coverage:

Two-dimensional transition-metal dichalcogenide (2D TMD) layers are highly attractive for emerging stretchable and foldable electronics owing to their extremely small thickness coupled with extraordinary electrical and optical properties. Jung group reports a versatile and rational strategy to convert 2D TMDs of limited mechanical tolerance to tailored 3D structures with extremely large mechanical stretchability (2000% stretching) accompanying well-preserved electrical integrity and modulated transport properties. <https://pubs.acs.org/doi/abs/10.1021/acs.nanolett.9b01726>

Roy Receives NSF CAREER Award

Assistant Professor **Tania Roy** has been named a recipient of the National Science Foundation's CAREER Award. The award will fund Roy's research on artificial neurons and synapses. She and her research team are developing them using two-dimensional graphene heterostructures for neuromorphic computing. This means that, in the future, researchers will be able to create systems that can emulate the capacity and speed of the human brain for pattern matching, beating current systems that are bulkier, slower and more power hungry. This will revolutionize the field of machine learning and create devices where the machine-learning hardware is close to the sensor, giving rise to systems that are currently impossible to create. Neuromorphic circuits based on these devices include smart wearables that can monitor health biometrics and issue first level triage for elderly people alone at home. They can improve autonomous driving for terrestrial vehicles. These circuits will be especially useful for spacecraft and space rovers because these ultra-light circuits will not be a bottleneck to the rocket's payload. Fast pattern recognition abilities through these deep neural networks will enhance speech recognition in portable electronics and improve traffic analysis and control systems.

Feng Named UCF's First Sloan Research Fellow

Xiaofeng Feng has been named a Sloan Research Fellow, the first for the University of Central Florida. The award recognizes early career scientists that demonstrate high promise. Past Sloan Research Fellows have gone on to do big things. Collectively they have received 47 Nobel Prizes, 17 Fields Medals in mathematics, 69 National Medals of Science and 18 John Bates Clark Medals in economics. "It is a great and humbling honor to receive the Sloan Research Fellowship as a recognition of my research efforts at this stage in my career," Feng says. "Being named a Sloan Research Fellow is a strong encouragement to my research efforts and interests in electrocatalysis at UCF. The fellowship has provided me the confidence to pursue my goals in tackling scientific challenges on renewable energy conversion." Feng joins the 2019 Sloan class of 126 scientists from the United States and Canada. Feng will receive a two-year \$70,000 fellowship to further his research. The best part, the money has only one restriction — it must help advance his work.

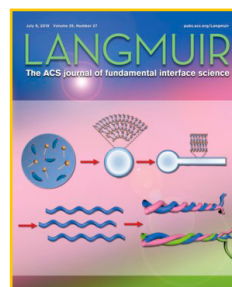
Tetard Receives NSF CAREER Award

Laurene Tetard, who is jointly appointed in the physics and materials science and engineering departments, has received an NSF CAREER Award. The award is worth \$404,000, to be spread out over five years. The goal is to help the chemistry division develop an instrument for plasmonic-assisted nanomechanical detection for polarized spectroscopy and imaging.

Congratulations to Prof. Fang:

Dr. Jiyu Fang, a professor in The Department of Materials Science and Engineering, has been appointed as a director of Advanced Materials Processing and Analysis Center (AMPAC), an interdisciplinary materials research and education at the University of Central Florida. AMPAC also administers Materials Characterization Facilities (MCF), which provide faculty, students, and industrial partners with accesses to state-of-the-art equipment and hands-on training services.

Dr. Fang's research has focused on the design and synthesis of stimuli-responsive soft materials for biomedical applications such as biosensors and drug delivery.



Seal Receives International Awards, Fellows, Hall of Fame

Sudipta Seal, an engineering professor and chair of UCF's Department of Materials Science and Engineering, will receive two international awards in the coming months for his contributions to materials science research. He received the prestigious Materials Research Society Fellow award at the MSE Spring meeting (2019). Seal will be the first at UCF to receive this award. With his designation as an MRS Fellow, Seal joins the ranks of other top researchers in his field from around the world and the United States. In June, he travelled to China to give a series of lectures and received the Lee Hsun Lecture award from the Chinese Academy of Sciences' Institute of Metal Research. The award honors scientists who have made significant contributions to the field of material science both in the scientist's country and abroad. Seal has been named a Fellow of the Royal Society of Chemistry, one of the oldest chemical societies in the world. The society includes more than 54,000 members whose discoveries and innovations help shape the future. Designation as a fellow in the society means a researcher has made a significant impact in their field related to chemical sciences. Seal says, "And understanding materials chemistry at the nanoscale, in particular for new nano-therapeutics development, is part of our group's expertise." He has been inducted into the Florida Inventors Hall of Fame.

STUDENTS IN THE NEWS

Incoming Student Awarded Trustee Fellowship

Ross A. Osborne has joined the MSE graduate program with a Trustee Fellowship. He received his B.S. from the University of Louisville and worked as a material scientist at Lawrence Livermore National Laboratory.

Saraf Receives Travel Grant

Materials science and engineering student **Nileshi Saraf** (advised by Dr. Sudipta Seal) received a travel grant to present at the Americas International Meeting on Electrochemistry and Solid State Science. The meeting was a joint international meeting of the Electrochemical Society, held in Cancun, Mexico.

Jeyaranjan Selected for ASM International Board of Trustees



Doctoral student **Aadithya Jeyaranjan** (advised by Dr. Sudipta Seal) was selected to sit on the prestigious ASM International Board of Trustees as a student member. The selection was based on his excellent credentials, leadership experience, knowledge of the field and society. This unique opportunity will enable him to speak on behalf of students and gain first-hand experience with the issues and matters of the materials science and engineering community as well as network with some of the best leaders in the materials science community.

Mehta Awarded Dean's Dissertation Fellowship

Doctoral candidate **Abhishek Mehta** is awarded the dean's dissertation completion fellowship, which is worth \$10,000 plus the cost of tuition. Mehta is a research assistant in Professor Yongho Sohn's Laboratory of Advanced Materials and Additive Manufacturing. His dissertation work focuses on exploring the fundamental core effects in novel metallic alloys named high entropy alloys. Has authored 13 journal publications and has an M.S. in materials science and engineering from UCF with a 4.0 GPA. In addition to the dissertation completion fellowship, he was previously awarded the Davis and Jane Donaldson Memorial scholarship, worth \$5,000, and the Gerald R. Langston Endowed scholarship, worth \$1,000.

Rossmann named in 20 Twenties to Watch



Aviation Week Network, in collaboration with the American Institute of Aeronautics and Astronautics, has announced that materials science and engineering student **Linda Rossmann** (advised by Dr. Seetha Raghavan) has been named one of the 20 Twenties to watch in 2019. Rossmann and 19 other students in the nation were identified as the top aerospace-bound students from an international field of highly qualified candidates, with the final selection based not only on academic performance but also on ability to contribute to a broader community. She was honored during Aviation Week's 62nd Annual Laureates Awards in Washington DC. Rossmann earned her undergraduate degree in mechanical and aerospace engineering.

Graduate Students Win at Research Forum

Two of Assistant Professor Elizabeth Brisbois' graduate students won awards for their posters at the Graduate Research Forum:

Manjot Kaur Chug – "Integration of Antifouling and Nitric Oxide Releasing-Polymer for Enhanced Biocompatibility of Insulin Cannula." Manjot was selected to represent UCF at the statewide Graduate Research Forum.

Corbin Feit – "Development of S-nitroso-N-acetylpenicillamine (SNAP) Impregnated Medical Grade Polyvinyl Chloride for Antimicrobial Medical Device Interfaces"

Tangfei Jiang's student, **Golareh Jalilvand**, also won for her poster, "Effect of a Metallic Cap Layer on the Magnitude, Statistical Variation and Mechanism of TSV Extrusion."

Le Receives Honorable Mention for Goldwater Scholarship

Minh-Chau N. Le, a mechanical engineering major and materials science and engineering minor, was named an honorable mention for the Goldwater Scholarship. The Goldwater Scholarship is a prestigious scholarship that seeks to identify and support college sophomores and juniors who show exceptional promise of becoming the United States' next generation of research leaders in the natural sciences, engineering, and mathematics. Le is a Provost Scholar, a 2018 Order of Pegasus recipient, and is in both University Honors and Honors in the Major. Her research focus is in the area of bioengineered materials and devices—an exciting field that offers much promise for tackling some of the most pressing societal challenges in health, energy, and structural mechanics. Le is specifically interested in developing biomaterials for cancer research that can be used to model tumor progression, screen new cancer drugs, and assess their efficacy in pre-clinical trials.

ALUMNI NEWS

Mohanty Named Program Manager



Dr. Rashmi R. Mohanty (UCF '09, advisor Dr. Yongho Sohn) is a program manager and principal scientist at the Global Research and Technology Center of Novelis Incorporated in Kennesaw, Georgia. In his current role, he is responsible for the development of advanced high strength aluminum alloys for automotive structural applications. He has accrued more than 12 years of experience in design and development of automotive steels and aluminum alloys, taking them from the inception stage in the laboratory to the commercial production. Dr. Mohanty is a recipient of the Gilbert Speich Award from Association for Iron and Steel Technology (AIST) and has authored several technical papers and patent applications. He is a member of American Society of Materials (ASM), Society of Automotive Engineers (SAE), Aluminum Technology Group (ATG) and a former member of the Alloy Phase Diagram Committee of ASM. He has been a reviewer for multiple journals articles and currently serves as an industry mentor to MSE students at Georgia Institute of Technology.

Alumni Awarded \$75k Grant



Two UCF alumni are in the process of developing a self-heating blanket that will protect infants from hypothermia in low- and middle-income regions, increasing their chances of survival. **Ajay Karakoti** '10 Ph.D., and **Satyanarayana Kuchibhatla** '08 Ph.D. (both advised by Dr. Sudipta Seal), received a grant of more than \$75,000 to continue their development of a non-electric blanket, which is made entirely of ecofriendly and nontoxic materials and heats independent of any outside source. "Imagine a baby born prematurely somewhere in rural India needing to be transferred to a specialty clinic in a nearby town. How can you keep a baby warm during transport for 2-4 hours when you don't have access to an incubator?" Kuchibhatla says. "Addressing this need is the crux of this innovation."

The packaged blanket begins heating as soon as the package is opened.

The researchers expect the cost to be less than \$25 and they aim to have full-size prototypes ready by the end of the year. The grant came from Grand Challenges Canada, which is funded by the national government and other partners. The program announced recently that it is investing in 100 new ideas to address persistent challenges in women's and children's health.

MSE Alumni Recognized with Distinguished Alumni Award



Alumnus **David Reid** is the latest recipient of the Distinguished Alumni Award. Reid is the president and CEO of Helicon Chemical Company. He founded the company during his last year of graduate studies at UCF to pursue his passion for technology commercialization. This year, Helicon Chemical was awarded its 10th government contract for advanced materials development, with plans to expand research and manufacturing operations in Central Florida and the Space Coast. Reid continues to maintain strong ties to the UCF community to build a legacy of innovation in the region. His work has spanned the fields of optics, structural materials, environmental remediation, rocket propulsion, energetic materials, and biotechnology. While at UCF, he was a recipient of the Robert D. Kersten Graduate Fellowship and won the prestigious AVS National Student Award for his contributions to the field of nanotechnology. He has co-authored 17 peer-reviewed scientific journal articles, numerous conference proceedings, and has 10 patents and patents pending. He resides in Cocoa, Florida, and sails when he is not in the lab.



Materials science and engineering alumnus **Stephen Nonnenmann** has been awarded a National Science Foundation CAREER Award for his work in the area of defect chemistry. Nonnenmann works as an assistant professor of mechanical engineering at the University of Massachusetts-Amherst, and is now seeking exceptional, highly-motivated undergraduate or master's-level students who are interested in working on his funded project in the area of oxides and surface science.

COMMUNITY OUTREACH

Yang Featured in Local News Consumer Report



In a story to the local consumer reporting news segment **Dr. Yang Yang** provided information about Lithium Ion batteries. As reported he described that in rare cases lithium ion batteries can catch fire. Defects and misuse are likely culprits in these rare cases. Dr. Yang says a swelling lithium battery is an early warning it needs to be replaced and cautioned against leaving a laptop plugged in overnight.

Seal Visits Institute of Metal Research



Professor **Sudipta Seal** in June 2019, visited the Institute of Metal Research at the Chinese Academy of Sciences. During the visit, Seal delivered a lecture titled "Nanocerium with engineered defects: Antioxidative Mimetic Enzymes." In his lecture, he discussed the role of CNP to accelerate the wound healing process through reducing the oxidative/nitrosative damage and inducing a proliferative effect on the migration of keratinocytes, fibroblast, and vascular endothelial cells. He also talked about mutual research collaboration, student exchange between MSE, UCF and Chinese Academy of Sciences.

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:

- **Dr. David Mitchell**, Siemens Energy, "Ceramic Matrix Composites: Its Black and White"
- **Dr. Paul Voyles**, University of Wisconsin-Madison, "Solving Structurally Complex Materials"
- **Dr. Andrew Dickerson**, University of Central Florida, "Fluid-structure Interaction in Two Classes of Fluid Jetting"
- **Dr. Kenneth Gall**, Duke University, "Translation of New Materials into Medical Implants"
- **Dr. Jagdish (Jay) Narayan**, North Carolina State University, "Discoveries of Q-carbon and Q-BN and Direct Conversion of Carbon into Diamond and h-BN into c-BN"
- **Dr. Richard Sisson, Jr.**, Worcester Polytechnic Institute, "Research at the Center of Heat Treating Excellence (CHTE) at Worcester Polytechnic Institute"
- **Dr. Punnathat (Tent) Bordeenithikasem**, NASA Jet Propulsion Laboratory, "Additive Manufacturing of Metallic Glasses"
- **Dr. Bruce Dunn**, University of California, Los Angeles, "Creating Pseudocapacitive Materials for High Rate Energy Storage"
- **Dr. Amit Misra**, University of Michigan, Ann Arbor, "Designing Metallic Nanocomposites for High Strength and Damage Tolerance"





University of Central Florida

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

12760 Pegasus Drive, Engineering I, Suite 207
Orlando, Florida, 32816
mse.ucf.edu
www.linkedin.com/company/ucf-mse/



DR. SUDIPTA SEAL

Department Chair

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

"Materials Science and Engineering (MSE) is starting a new undergraduate program. It is the first new undergraduate program that has been introduced in CECS since I have been the dean of the College (May 2013). We are all very excited about this new addition to our undergraduate repertoire and we are confident that the program will attract a good number of outstanding students. Being the second in the State of Florida undergraduate MSE program we believe that it will fulfill the needs of the industry in the state and nationally. We also believe that it will increase the national visibility for the MSE Department which was created only a few years ago (Summer of 2012) and now is 23 faculty strong, spanning a wide variety of research and teaching expertise."

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

"There is much excitement about the BSMSE program that gives students an exciting new option for jobs in Central Florida and beyond, as well as opportunities for research with our talented MSE faculty"

*Prof. Charles Reilly, Associate Dean,
College of Engineering and Computer Science.*



Donate to MSE today at UCFfoundation.org