

BEAMING UP

PROBING WITH LIGHT: Ji-Xin Cheng (BME, ECE, CHEM, PHYS, MSE) joined BU in 2017 as the Moustakas Chair Professor in Photonics and Optoelectronics and recently became a MSE appointed faculty member. His research team invents new ways to study the body using light rather than more invasive approaches.

PRODUCTIVITY SNAPSHOT

- Secured \$10M+ in grant funding.
- Opened a bustling new laboratory with 30 researchers.
- Elected OSA Fellow and received the OSA Ellis R. Lippincott Award.

PROJECT PREVIEW

ULTRASOUND NEUROMODULATION FOR BRAIN STIMULATION: Cheng is advancing neurological disorder treatment by elucidating the effects of a non-invasive brain stimulation technique. The project is backed by a \$3.3M grant from the NIH BRAIN Initiative.

BLUE LIGHT PHOTOTHERAPY AND HYDROGEN PEROXIDE: The team produced a medical treatment that is expected to kill 99.9% of tested MRSA infections. It's entering clinical trials.

PINPOINTING THE POSITION OF A TUMOR: The lab developed a tool called AcouStar to make lumpectomies faster and more precise. The team just completed the second round of successful cadaver testing.

SUPERSTARS



Six years ago, Siddharth Ramachandran (ECE, MSE) revealed how 'tornado light beams' could revolutionize the fields of telecommunications, imaging and sensing with a paper published in *Science*. Now, he is being recognized for these revelations. Ramachandran was recently elevated to IEEE and SPIE Fellow, named **Vannevar Bush Faculty Fellow** and published in *Nature Communications*.



On top of receiving an NSF Early Career Award, Michelle Sander (ECE, MSE) received \$2.7M as co-PI on a NIH grant to develop a high-speed microscope system to image neuronal activity.

FACULTY

86 FACULTY
FROM 3 COLLEGES

NEW: 6 appointments
NEW: 1 promotion to professor
53 appointed & 33 affiliated
37 average H-index
9,000 average # citations

7 FELLOWS
TO NATIONAL ACADEMIES

NEW: NAE, David Bishop
NEW: NAI, Vinod Sarin
4 National Academy of Inventors
2 National Academy of Engineering
1 National Academy of Sciences

54 FELLOWS
TO PROFESSIONAL SOCIETIES

NEW: 9 fellows elected this year
AT THE TOP: Xin Zhang has 6 fellowships, including American Association for the Advancement of Science.

29 EARLY
CAREER AWARDS

NEW: 4 recent career awards
NEW: 5 research awards, including the Pritzker Award to Christopher Chen

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TOP 10 ACTIVE MSE GRANTS

\$20 Million

To launch ERC CELL-MET and fabricate personalized heart tissue | David Bishop

\$4 Million

To confirm the cause of two incurable lung diseases | Bela Suki

\$3.5 Million

To identify which genes cause bone mineral density | Elise Morgan

\$3.4 Million

To create new agents to treat cancer, viral and bacterial illnesses | David Coker & John Porco

\$3.3 Million

To make new lighter, energy efficient electronic materials | Enrico Bellotti & Luca Dal Negro

\$3.3 Million

To understand ultrasound stimulation at sub-cellular level and in different brain regions | Ji-Xin Cheng

\$3 Million

To explore cell-to-cell communication and cooperation in engineered tissue | Christopher Chen

\$3 Million

To understand the fundamental interactions of matter with light carrying orbital angular momentum | Siddharth Ramachandran

\$2.8 Million

To model how tumors invade their surroundings and escape into neighboring vessels | Joe Tien

\$2.7 Million

To deliver a high dose of cancer medicine via a nanoparticle-based solution that spares patients of side effects | Mark Grinstaff



BOSTON
UNIVERSITY

MATERIALS

SCIENCE & ENGINEERING

MSE CELEBRATES 10 YEARS!

BIO | PHOTONIC & ELECTRIC | NANO | ENERGY & ENVIRONMENT



+ SCIENTIFIC AMERICAN
Professor Sahar Sharifzadeh (ECE, MSE) was named a Rising Star of Science by *Scientific American* and received a NSF CAREER award.

WHAT'S INSIDE?

- + New faculty
- + \$30M in expenditures
- + Rising stars

+ BRIGHT FUTURE

PhD candidate Anisha Joenathan's work reflects perspectives of her interdisciplinary labmates from chemistry, physics and engineering.

CONSUMER READY TECH

HELPING BURN VICTIMS: Changing a wound dressing on a second-degree burn is so painful that doctors must anesthetize pediatric patients. To address this, Mark Grinstaff's interdisciplinary team found a less painful option. They created a hydrogel dressing composed of two polymer components that can dissolve on-demand with an aqueous solution. This innovative treatment is being translated to the commercial sector in partnership with a start-up called Dendricare, co-founded by BU alum Aaron Colby.

STRIKER BUYS FDA-APPROVED BRAIN SEALANT: Grinstaff has a reputation for successfully transitioning research into industry-deployable technologies. This year, one of his projects came full circle. Sixteen years ago, he and a PhD advisee launched HyperBranch Medical Technology; a company that is largely recognized for inventing the second FDA-approved brain sealant. Last December, the entrepreneurs were bought out by Striker for \$220 million.

MERCK PARTNERSHIP: Muhammad Zaman (BME, MSE) secured a strategic partnership with Merck Global Health and is preparing to deploy *PharamaChk*, a user-friendly tool that tests medicines for contamination. The team aims to make the device globally accessible - particularly in areas at high risk for pill contamination.



Grinstaff has 11 active grants totaling more than \$13M.

RESEARCH EN ROUTE



The formation of abdominal adhesions after surgery will be stymied by a non-invasive treatment developed by Joyce Wong (BME, MSE) and collaborators. The team is edging towards commercialization through a federally funded business development program.



Bela Suki (BME, MSE) might have identified the cause of two incurable lung diseases: emphysema and pulmonary fibrosis. Backed by a \$4M NIH grant, Suki is launching a new lab to verify the discovery.

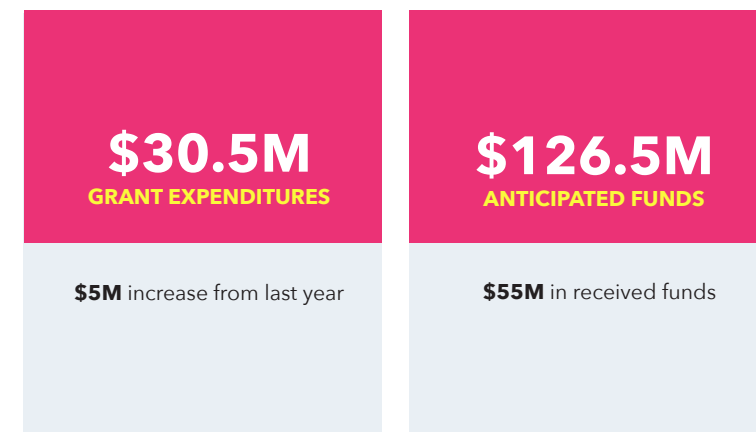
BU MSE

Celebrating 10 years of graduate academics & impactful research.

"CLIMATE CHANGE, CANCER AND HEART DISEASE... WE TAKE AN INTERDISCIPLINARY APPROACH TO SOLVING THESE PROBLEMS."

MSE Head David Bishop (ECE, MSE, PHYS, BME, ME)

FUNDING



BIG IMPACT

SPIDERS FOR SURGERY: New professors Tommaso Ranzani (ME, MSE) and co-PI Sheila Russo (ME, MSE) established a process to make soft and flexible robots. They tested their process by making spider-like devices that can help precision in surgery.

KILLIN' IT: Russo was named 1 of 5 women 'killin it' in the field of robotics according to University Network. Also in the last year, Russo participated in two programs aimed at improving diversity in STEM in the local and regional community.

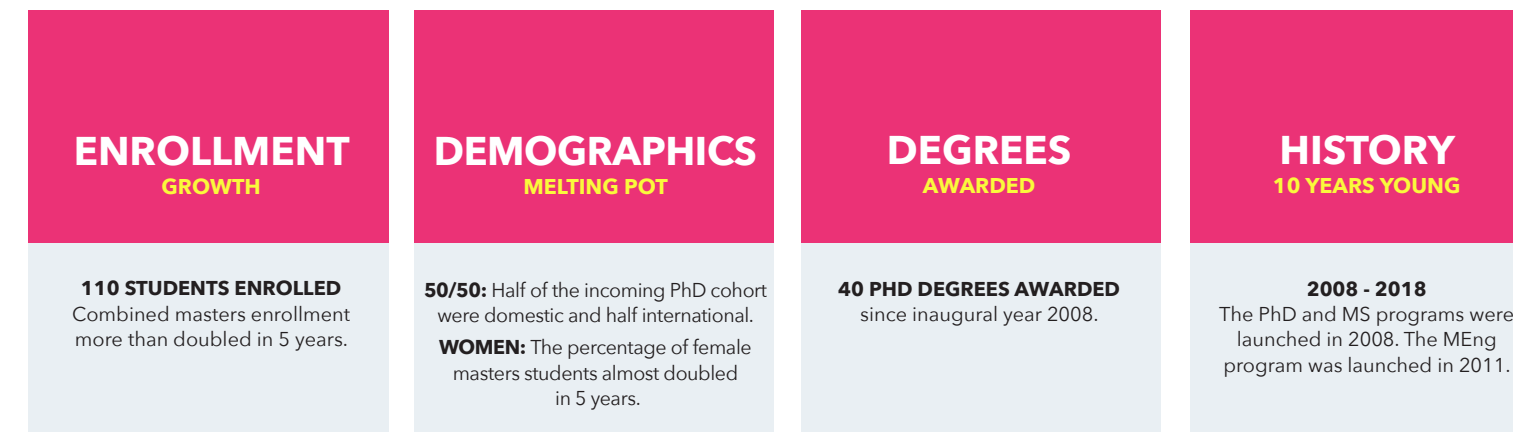


Xin Zhang (ME, ECE, BME, MSE) made three major contributions to the field of nanomaterials this year. She invented a small ring like structure made of plastic and copper that successfully improved MRI image quality and cuts scan time in half. Her team released a new acoustic metamaterial that blocks around 94% of sound and maintains airflow. Plus, Zhang used algae to create nanowires!

NEWS BITES

- *TIME* magazine features Douglas Holmes (ME, MSE).
- Michael Albro (ME, BME, MSE) treats osteoarthritis by growing cartilage.
- PRISM names James Bird (ME, MSE) as a top researcher.

ACADEMICS



GLOBAL REACH



NEW SOLUTIONS: Alum Lincoln Miara (PhD '11) works at Samsung Electronics on next generation battery technologies with collaborators around the world. Most recently, he built a robotic machine that synthesizes inorganic materials to improve reliability, reduce safety risks and decrease turnaround times.

GREEN TECH CONFERENCES: Miara's PhD research advisor Srikanth Gopalan (ME, MSE) hosted BU Materials Day 2018 on the topic of Novel Materials for Electrochemical Energy Conversion and Storage.

Harry Atwater (Cal Tech) was the keynote speaker at the Saint-Gobain Materials Science Lecture at Boston University. The event was hosted by MSE Associate Division Head Lawrence Ziegler (CHEM, MSE) on the topic of "Light as Fuel."

LOCAL INFLUENCE



Emily Ryan (ME, MSE) preserves the life of lithium batteries by working to suppress dendrite growth. Most recently, Ryan was appointed Director of Boston University's Institute for Sustainable Energy.



\$1.5M from DOE was awarded to David Coker (CHEM, PHYS, MSE) to develop quantum information science systems.

MAJOR RESEARCH CENTERS

