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## Ross receives prestigious Alumni Achievement Award

ESM alumnus Benjamin Ross ('06 E SC, '07 M.S. ESMCH) chose Penn State for its success—now the University has chosen him for his.

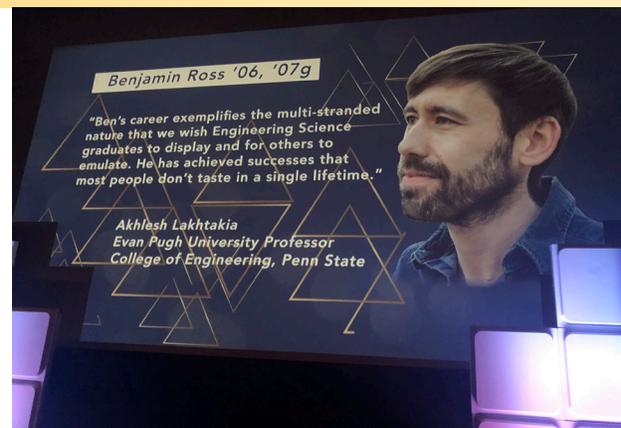
A combination of the Schreyer Honors College, the breadth and depth of the engineering science program, and the “golden gleam in the Nittany Lion’s eye” led **Benjamin Ross** to Penn State. Now, that path has led him to being named one of 15 recipients of the 2019 Penn State Alumni Association Alumni Achievement Award, which recognizes alumni 35 years of age and younger for their extraordinary professional accomplishments.

Ross, who grew up in Allentown, Pennsylvania, is an entrepreneur, technologist, and musician—and someone who’s always felt the desire to make an impact in the world.

“I saw I could make some impact by publishing papers, but I thought I could make a greater impact by starting companies,” said Ross. “I started taking classes at the Haas Business School at Berkeley and met some great people. Once that entrepreneurial bug bit, it really bit!”

Ross is founder and chief technical officer of POWr.io, which provides customizable, easy-to-use, and affordable solutions to help businesses grow online. POWr has helped more than 12 million small businesses grow, and the company has doubled in size each of the last two years.

After earning a Ph.D. from the University of California, Berkeley, where he studied the interface of nanotechnology, biology, and



Ross in the spotlight at the Alumni Achievement Award ceremony.

photonics, Ross founded a series of startups, including Diasses, a company that provides rapid point-of-care DNA testing. He also served as the lead developer of Go Overseas, described as “Yelp for overseas travel, study, and volunteer experiences.”

Ross’ high school physics teacher convinced him to pursue a degree in engineering, and he says he likely would not have ended up at Penn State if it wasn’t for the ESM program, which he credits for a great deal of his success.

“ESM taught me not to be afraid to learn new fields,” said Ross. “You might call ESM the closest to ‘choose your own adventure’ in the engineering field. I continued on that path in my Ph.D. and afterwards ... I’m not sure I will ever stop choosing my own adventure.”

## Message from the Chair



Thanks for telling us you missed *Connections*. After three years with ESM, **Chris Spallino** accepted a position in Pittsburgh. We wish him every success and hope to have a new communications strategist soon. **Carrie Friday**,

ESM's administrative assistant (AA), retired in July after 35 years at Penn State and 11 years in ESM. Travel, beaches, and lots of relaxation are in Carrie's future. We were fortunate to welcome new AA **Nicole Wolfe**, who joins us after 18 years at Penn State and eight years with the Strategic Interdisciplinary Research Office.

A big thanks to **Rich Smith** for leading PSESMAS during multiple transitions over the last three years. While handing over the reins to **Chuck Gaston**, Rich will continue to be an active member.

ESM's undergraduate growth continues with 144 officially declared majors and 13 intended. We will have our final count after major night. Last year we taught three sections of each of our core honors courses instead of one.

Likewise, our M.D./Ph.D. degree is growing. **Scott Tucker** graduated with his Ph.D. in May and is now completing his third year of medical school, specializing in orthopaedics. **Mallory Peterson** and **Greg Brown** are now Ph.D. students, and **Michael Sha** and **Matthew Molinaro** are in their second and first medical years, respectively.

Wishing you all a very happy Thanksgiving.

Enjoy fall ... and come and visit.

*Judith A. Todd*

Judith A. Todd



Carrie Friday



Nicole Wolfe



Scott Tucker

## Faculty Spotlight

### Özdemir receives DURIP grant to improve physical properties of 2D materials

**Şahin K. Özdemir**, associate professor of engineering science and mechanics, recently received \$650K from the Defense University Research Instrumentation Program (DURIP) for his project titled "Time-Resolved Spectroscopy of Parity-Time Symmetric Programmable Materials." Özdemir's goal is to develop an instrument that will enable better understanding of time-resolved photonic and phononic properties of programmable materials made of layered 2D materials such as polymers, and allow the probing of quantum properties of optical emissions and interactions.

The success of this approach could provide new opportunities for creating next-generation photonics, spintronics, and phononic materials and devices. It could also lead to the development of a Penn State quantum center to support ongoing University efforts in quantum research and proposed Department of Defense projects.



## Graduate Spotlight

### Ren awarded funding for industrially sponsored research

**Liqiang Ren**, doctoral candidate in engineering science and mechanics, received the 2019 Thomas and June Beaver Fund Award from the Penn State Graduate School. The fund provides financial assistance to outstanding full-time graduate students performing industrially sponsored research in connection with the Ben Franklin Partnership Fund Program.

Ren is conducting research on the development of ultrasound-based, micro/nanoparticle manipulating techniques and their applications in biomedical and clinical research. He has developed a microfluidic device that uses ultrasound to sort different types of human cells in a high throughput manner. With a compact size, high precision, and low cost, the device could be used as a point-of-care diagnostic tool and improve the health condition of patients in resource-limited regions.



## Undergraduate Spotlight

### Barker serves as spring student marshal

**William Barker** ('19 E SC, minor in nanotechnology), was selected as the engineering science student marshal for the College of Engineering's spring commencement ceremony.

A Schreyer Scholar, Barker completed an honors thesis titled "An Investigation of Resistive Random Access Memory" and completed two additional undergraduate research projects. He was president of the Society of Engineering Science (2018-2019), a student member of the Institute of Electrical and Electronics Engineers (2018-2019), and a teaching intern, aiding in the instruction of statics and strength of materials courses. He was also the recipient of multiple scholarships and awards. Barker will pursue a master's degree in engineering science and mechanics at Penn State through the ESM department's Integrated Undergraduate/Graduate program.



## Davis named Outstanding Engineering Alumnus



Growing up in State College, with a father who worked at the Applied Research Laboratory, Tim Davis ('86 E SC) knew he would attend Penn State

for engineering. What he didn't realize when he graduated was his degree would be a perfect fit for his career.

"Going into college, I struggled with which engineering discipline I wanted to study, but I knew I wanted a challenging program," said Davis. "After being admitted to Schreyer Honors College, and with engineering science being the honors program for the College of Engineering and a multidisciplinary one, engineering science seemed like the logical choice."

Following graduation, Davis earned a Ph.D. in electrical engineering from Cornell University and planned to land a traditional research or academic position. However, an unexpected opportunity changed the course of his career.

"A Cornell associate discovered that the university had intellectual property around micro-electro-mechanical systems (MEMS) technology that it didn't know what to do with," said Davis. "He wanted to start a company but needed someone to develop the technology, so I agreed to be his partner."

In 1993, Davis cofounded Kionix, assuming the role of vice president of research to commercialize MEMS. The company's first product—micro mirrors—were incorporated into internet switch boxes to redirect fiber optic signals. The success of this niche product during the telecommunications boom in the late 90s resulted in part of the company being purchased in 2000.

Building on this success, Davis then guided the development of 3D motion sensors that would eventually be used in laptops, gaming systems, and smartphones, where the most common applications became screen rotation and pedometry. As a result, Kionix became the third largest supplier worldwide of



*Tim, Carol, and Eric at the OEA ceremony.*

3-axis MEMS accelerometers, selling more than one billion sensors.

Kionix was fully acquired in 2009, and Davis retired as chief technology officer in 2016. He remains an adviser to Kionix and a member of its board of directors.

"The products we developed were an amalgamation of all the sub-disciplines I was exposed to in engineering science," said Davis. "Each were invaluable, and I definitely chose the perfect program."

Davis lives in Trumansburg, New York, with his wife, Carol, and his son, Eric.

## Faculty News/Honors/Awards



### Hamilton receives DARPA Young Faculty Award

Associate Professor **Reginald Hamilton** received a Defense Advanced Research

Projects Agency (DARPA) Young Faculty Award (YFA). Hamilton received the award for his research proposal, "Additive Manufacturing of Functional Hierarchical Shape Memory Alloy Structures." The YFA program identifies and engages rising research stars in junior faculty positions at U.S. academic institutions and exposes them to Department of Defense needs, as well as DARPA's program development process.



### Lakhtakia receives prestigious centenary award

**Akhlesh Lakhtakia**, Evan Pugh University Professor and Charles Godfrey Binder

Professor of Engineering Science and Mechanics, was one of eight recipients who received the Alumnus of the Century in Making Award from the Indian Institute of Technology (IIT) (BHU), Varanasi. The one-time award honors IIT (BHU) distinguished alumni who have made exceptional contributions to society.



### Demirel named Huck Chair in Biomimetic Materials

Professor **Melik C. Demirel** was named Lloyd and Dorothy Foehr Huck Chair in

Biomimetic Materials by the University's Huck Institutes of the Life Sciences. Demirel's current research focuses on recent advances in biotechnology and materials science for biosynthesis of eco-friendly and environmentally sustainable materials (i.e., biodegradable, self-healing, and self-repairing) that are an excellent alternative to plastics.



## ESM Today Showcases Tomorrow's Innovators

If you wanted to learn more about “Optical optimization of nonhomogeneous ultrathin CIGS solar cells,” “miR-148b enriched 3D printed hybrid scaffolds for critical-sized calvarial bone defect repair,” “Field-Deployable Guided Wave Transducers for High Temperature Applications,” or much more innovative student research, then ESM Today 2019—the 16th Annual ESM Research Symposium—was the place to be.

The event, organized by the ESM Graduate Student Council, gives undergraduate and graduate students the opportunity to present their work through oral and poster presentations to peers, colleagues, and faculty; exchange ideas across the various research disciplines; and hone their presentation skills. Presenters were required to explain their work in a way that is easily understandable to both engineers and scientists who are not specialists in a presenter’s discipline.

This year’s symposium was held on Feb. 9 in the EES Building and showcased the research of 38 undergraduate and

graduate students. Approximately 75 people attended this year’s event, and 27 students gave a total of 14 oral presentations and 13 poster presentations. Six students competed in the Art in Science exhibition, displaying their research using a single slide showing one impactful image of their research along with a short caption.

Oral presentations were split into two groups, with first prize in Group 1 going to Joseph Nasr for his paper titled “High Performance Glasstronics for Internet of Things (IoT)” and first prize in Group 2 going to Sarbashis Das for his paper titled “Neuromorphic Synapse Using Split Gated MoS<sub>2</sub> Transistors.”

Amir Reza Aref took home first prize in the poster competition with “Development of high energy and power density electrochemical capacitors.” Madhuri Dey captured top honors in the Art in Science exhibition with “T cells attacking a cancer cell.”

The day’s events also included an opening keynote speech from Christine Masters, assistant dean for academic support and global programs. Her presentation was titled “Life is what happens while you are making other plans.”

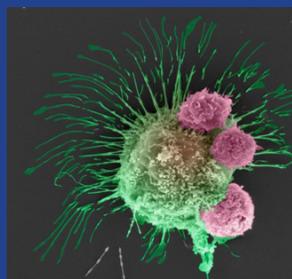
## Alumni News



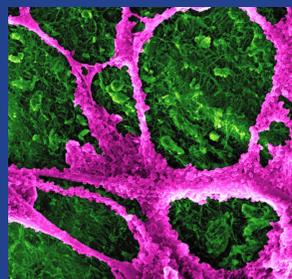
**Daniel Ahmed** ('06 E SC, '09 M.S. ESMCH, '12 Ph.D. ESMCH) was appointed assistant professor in the department of electrical and computer engineering at the Technical University of Munich,

Germany, effective Sept. 2019. Funded by a 1.5M euro award from the European Research Council, Ahmed’s research will focus on new developments in robotics and manipulation systems that could have significant impact in the fields of cancer research, brain research, and vasculature biology. He, along with his research team, will develop innovative acoustic robotics systems for applications in medicine, with the goal of improving the understanding of diseases and developing relevant treatments.

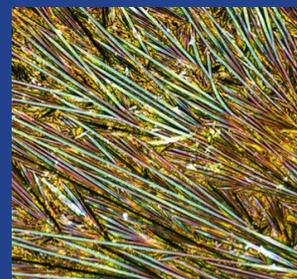
### Art in Science Exhibition



**T cells attacking a cancer cell**  
Madhuri Dey  
First Place



**Biominerallization**  
Kazim Kerim Moncal  
Second Place



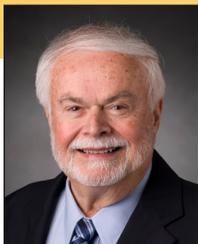
**Aggregation of SiO<sub>2</sub> nanoparticles**  
Amritanand Sebastian  
Third Place



# ESM Frontiers

ESM celebrates a pioneer of ultrasonic guided waves

## After 27 years at Penn State, Professor Joseph Rose retires



During his 45 years of teaching, with 27 of them at Penn State, **Joseph Rose** often used storytelling and his own life's lessons in class to help students transition from academia to the "real world." Now, Rose has added a new chapter to his story—retirement.

An international leader in the fields of wave mechanics, ultrasound, and ultrasonic guided waves, Rose served in the ESM department since 1992 as the Paul Morrow Professor of Engineering Design and Manufacturing in the College of Engineering.

"I have thoroughly enjoyed my time at Penn State and all my years of teaching—the work was like being on a vacation every day, as I could work on projects or teach courses that I was passionate about," said Rose.

During his time with the department, Rose was the principal adviser to 40 Ph.D. students and more than 60 master's students. He has been honored by the University for his teaching and research with a 2011 Graduate Faculty Teaching Award, a 2002 Penn State Engineering Alumni Society (PSEAS) Premier Research Award, a 1997 PSEAS Outstanding Research Award, and a 1996 Penn State Faculty Scholar Medal for Outstanding Achievement.

Rose has also received numerous industry awards for his innovative work in ultrasonic guided waves for nondestructive evaluation (NDE) and structural health monitoring,

including the 2014 Roy Sharpe Prize from The British Institute for Non-destructive Testing (BINT), the 2014 Mentoring Award from the American Society for Nondestructive Testing (ASNT), the 2011 International Society for Optics and Photonics Smart Structures/NDE Lifetime Achievement Award, the 2006 ASNT Research Council Award for Innovation, and the 2003 American Society of Mechanical Engineers (ASME) Nondestructive Evaluation Engineering Division Founders Award.

Rose began his academic career at Drexel University as an assistant professor in 1970. In 1988, he was named Albert and Harriet Soffa Professor in Mechanical Engineering. While at Drexel, he advised 20 Ph.D. students. Rose also worked in industry for several years at Hale Fire Pump (known today as Hale Products) and SKF Group.

He earned a Ph.D. in applied mechanics from Drexel University in 1970 and a master's degree in applied mechanics from Drexel Institute of Technology (DIT), now named Drexel University, in 1967.

Rose is a Fellow of ASNT, ASME, BINT and the Institute of Electrical and Electronics Engineers.

He holds 30 patents, has authored five text books, and published more than 600 articles on such topics as ultrasonic NDE, wave mechanics, medical ultrasound, adhesive bonding, pipe and tubing inspection, bridge and rail inspection, composite material inspection, ice detection,



structural health monitoring, signal processing, and pattern recognition. His publication work has received more than 18,000 citations.

Rose is also the founder and chief technology officer for Guidewave (FBS, Inc.), which plans, designs, builds, and maintains guided wave solutions for pipeline, rail, aviation, power generation, manufacturing, civil infrastructure, natural gas and oil, nuclear, and military industries.

At Penn State, Rose taught a class titled Business Opportunities in Engineering, where he alerted students to the many entrepreneurship and intrapreneurship paths to success.

Rose will certainly not be sitting still in his retirement. He intends to continue guided wave research and product development as it relates to structural health monitoring. He also plans to interact with Professor Cliff Lissenden and the department's four new ultrasonics faculty members.

"I will miss many things and many people, but mostly, I will miss my interaction with graduate students and helping prepare them for successful careers," said Rose.



## Message from Your Alumni Society Chair

The ESM Alumni Society would like to congratulate Jonathan Pitt as the recipient of the Fall 2019 Early Career Recognition Award. Jonathan was one

of several very qualified candidates considered for the award. Notice will go out shortly for applications for the spring 2020 award. We are looking for alumni who have distinguished themselves in the areas of work, academia, or community involvement. If you know an ESM alum who you believe is deserving of the Early Career Award, we encourage you to submit their name for consideration. Nomination forms are available on the ESM alumni page on the ESM website: [www.esm.psu.edu/alumni/](http://www.esm.psu.edu/alumni/).

The ESM Alumni Society would like to congratulate Charles Gaston ('61 E SC) as the new president of the PSESMAS Board. We would also like to congratulate Mike Erdman ('69 E SC), the newly elected vice president of the Board. Both gentlemen were elected

at the Spring 2019 Board meeting. As the outgoing president, I would like to thank the members of the Board for their support over the past three years and to especially thank Dr. Todd and the ESM support team for all of their help during this time.

The ESM Alumni Society is comprised of alumni who have a broad range of backgrounds and careers. The purpose of the Alumni Society is to foster a connection between ESM alumni and current ESM students and faculty to positively influence the educational experience of students, expose students to the world of the practicing engineer, and assist the ESM department in promoting alumni outreach. If you would like to be a part of the ESM Alumni Society please contact Lisa Spicer, coordinator for alumni, development, and advancement, at 814-867-1569 or [lms8@psu.edu](mailto:lms8@psu.edu) in the ESM office.

Rich Smith ('73 E MCH)

**Thank you, Rich,  
for your service  
to PSESMAS!**

## Enroll in ESM Graduate Programs

**Doctor of Philosophy (Ph.D.) in Engineering Science and Mechanics (ESMCH)**

**M.D./Ph.D. in Engineering Science and Mechanics**

- Joint degree program with the College of Medicine

**M.S. in Engineering Science and Mechanics**

- Resident thesis and non-thesis programs (32 credits)

**M.S. in Engineering at the Nano-scale**

- Non-thesis program; 30 credits
- Significant hands-on nanofabrication experiences

**M.Eng. in Engineering Mechanics**

- Professional degree program; 30 credits

**Master's Degrees in Additive Manufacturing and Design**

- M.S. Resident program; 30 credits
- M.Eng. Online program; 30 credits



## WE ARE ... HIRING

The ESM department seeks applicants for a tenure-track/tenured faculty position in the area of advanced scanning/transmission electron microscopy (S/TEM). All academic ranks will be considered.

Please apply to [psu.jobs/job/90522](http://psu.jobs/job/90522)

## SUPPORT ESM

Donations to the department allow us to continue our tradition of excellence by supporting current and future world-class engineers, leaders, and innovators who can impact and advance the well-being of global society. Please remember ESM this holiday season.

[esm.psu.edu/department/giving-opportunities](http://esm.psu.edu/department/giving-opportunities)



## Contact ESM and Stay in Touch

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