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A monthly publication of the Batten College of Engineering and Technology

# illuminator

volume 3, issue 4

**PLUS:**  
**DECEMBER**  
**GRADUATE**  
**STORIES -**

~Dezmond Banks  
~Mahmudur Rahman  
...pg. 2

**PLASMA**  
**SCALPEL**  
**TAKES ON**  
**CANCER** ...pg. 4

**HONGYI (MICHAEL) WU**

named Fellow of the Institute  
of Electrical and Electronics Engineers

pg. 1



**ODU**

Batten College of  
Engineering and Technology



I am so very grateful for all the members and partners of the Batten College of Engineering and Technology community that help us meet students where they are and take them where they need to go.

May this holiday season remind us of the gifts of hope, peace, joy and love that have been bestowed upon us so that we may share them with our neighbors.



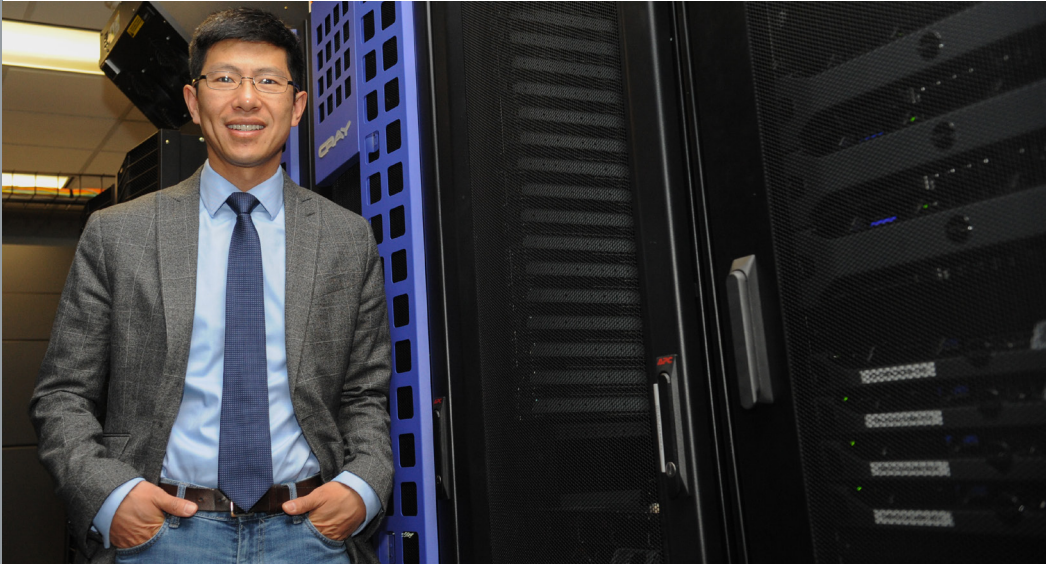
*Ben J. Stuart, Ph.D., P.E.  
Interim Dean  
Batten College of Engineering & Technology*

# illuminator

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## Wu named Fellow of the Institute of Electrical and Electronics Engineers



by Keith Pierce

**H**ongyi (Michael) Wu, Batten Chair of Cybersecurity and the director of the Center for Cybersecurity Education and Research (CCSER) at Old Dominion University has been named Fellow of the Institute of Electrical and Electronics Engineers (IEEE). The highest elected grade of membership within IEEE, the Fellow distinction is conferred by the board of directors to not more than one-tenth of one percent of the total voting membership.

IEEE honors members who have an extraordinary record of accomplishments in any of the IEEE fields of interest. They must be nominated by a senior colleague in the research community.

"I am honored to receive this highly valued acknowledgment from the world's largest technical professional organization," Wu said. "It means my research work is recognized by the research community."

Wu joined ODU in 2016 as a professor in the Department of Electrical and Computer Engineering and holds a joint appointment in the Department of Computer Science.

"I applaud IEEE for their recognition of Dr. Wu's contributions to the electrical engineering profession," said Oscar Gonzalez, professor and chair of ODU's Department of Electrical and Computer Engineering. "This recognition not only brings attention to his extraordinary research and leadership, but it helps shine a light on our department, our college and the university."

Wu's research focuses on networked and intelligent cyber-physical systems for security, safety and emergency management applications. He has chaired several conferences and served on the editorial board of several journals, including IEEE Transactions on Mobile Computing, IEEE Transactions on Parallel and Distributed Systems and IEEE Internet of Things Journal. He received

a National Science Foundation (NSF) CAREER Award in 2004, UL Lafayette Distinguished Professor Award in 2011 and IEEE Percom Mark Weiser Best Paper Award in 2018.

Since his arrival at ODU, he has participated in over \$4.5 million in externally funded research.

"I would like to express my personal appreciation to Dr. Wu for his contribution as a researcher and a leader," said Ben Stuart, interim dean of the Batten College of Engineering and Technology. "He has helped us increase our Bachelor of Science programs in cybersecurity from five students in the fall of 2015 to over 450 students this semester and has helped us increase our master's program from 14 students last fall to 55 students this fall. We are very fortunate to have him."

Before joining ODU, Wu was an Alfred and Helen Lamson Endowed Professor at the Center for Advanced Computer Studies at the University of Louisiana at Lafayette. He earned his B.S. degree in scientific instruments from Zhejiang University, Hangzhou, China, in 1996, and his M.S. degree in electrical engineering and Ph.D. degree in computer science from the State University of New York (SUNY) at Buffalo in 2000 and 2002, respectively.



Batten College of  
Engineering & Technology

# Dezmond Banks took a nontraditional path to ODU



Photo by David B. Hollingworth/ODU

by Charaje' Harrison

**Y**ears before he became a man of Alpha Phi Alpha and served as membership chair for the National Society of Black Engineers, Dezmond Banks' plans for his future were quite different.

Banks, 26, is a nontraditional student who will graduate in December with a Bachelor of Science in mechanical engineering technology. He initially did not see Old Dominion University in his career path because he had no intention of going to college.

From a young age, Banks remembers his father instilling a strong work ethic in him. It wasn't long before he got his hands dirty when his father introduced him to their family landscaping business. He quickly developed an entrepreneur mentality; when he turned 14, he obtained a work permit. Later, when Banks realized he needed a car to travel between work and school, his father joked that if he could get one of the older cars that was sitting in the yard running, he could keep it. After a couple of weeks, Banks powered back to life the engine of a 1981 Corvette.

***“My experience at ODU has aided me in becoming a well-rounded person.”***

So during high school, he saw more opportunity at the Sheehy Ford car dealership he was working for than college.

“Since I was young, I’ve always loved working on cars,” said Banks, noting that he passed the Virginia state inspector exam, allowing him to earn more money and perform advanced tasks, while he was a student at L.C. Bird High School in Chesterfield County. “During my time at the dealership, working as a service technician, I thoroughly enjoyed the challenges I faced daily. Although college was a popular decision among most, I didn’t feel like it was necessary to be successful.”

He added that some of his colleagues were college graduates and performing the same tasks he was.

“This made me question if the debt was worth the payoff,” he said. “At the time life was great. I was making enough money to sustain my lifestyle, traveling and overall stress-free.”

After four years at the dealership, he got a job at United Rentals’ Richmond Ariel Branch as a service technician, where he worked on construction equipment. One of his former colleagues there commended his intelligence and problem-solving skills and urged him to give college a try, telling him about the benefits higher education could yield to him.

But Banks still wasn’t sold until management offered to allow him to work part-time if he attended a community college part-time - an offer that branch had

never made before. Once he started his first semester at John Tyler Community College, he realized exactly what he wanted to do with his career. After receiving his associate degree in mechanical engineering technology, he wanted to enroll full-time at a university to complete his studies. His older brother, Thomas, graduated from ODU as a first-generation student. So Dezmond decided to keep tradition.

At ODU, he has been involved in a number of organizations, including the National Society of Black Engineers (NSBE), Alpha Phi Alpha Fraternity Inc., and Tau Sigma National Honor Society.

He said NSBE had the biggest impact. Through one of the organization’s job fairs, he landed a facility engineer internship in the summer of 2018 with Caterpillar in Decatur, Ill. He received a superior-performance evaluation grade and was recommended for full-time hire.

“NSBE has given me the opportunity to network with many professionals in the engineering field,” he said.

Banks, who plans to take the Fundamentals of Engineering exam in March, would ultimately like to become an entrepreneur and build custom engines. He said he truly enjoyed his time at ODU.

“My experience at ODU has aided me in becoming a well-rounded person,” he said. “With such a diverse community I have been able to interact with people from different backgrounds, professional levels and people who are just like me. My time here has shown me that school is more than just getting a degree; it’s about forming relationships. Yes, my degree will put me in position to be recognized by engineering companies. However, the relationships I have developed while obtaining my degree have provided me with references and mentors that will help further my professional and personal success.”

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*Charaje' Harrison is a student in entrepreneurship and public relations, a communication class which works in partnership with the University's Office of Strategic Communication & Marketing*

# A microscopic technology. An enormous distance.

*How tiny technology carried an international student all the way to a Ph.D.*

by *Matty Madden '21*

**T**he story of how Md Mahmudur Rahman earned his Ph.D. from Old Dominion University begins far, far away from Norfolk, Virginia. About 8,159 miles, to be exact. Rahman grew up in Dhaka, the capital city of Bangladesh. It was there that Rahman became interested in technology.

Rahman graduated from Bangladesh University of Professionals (BUP) with a Bachelor of Science in Electrical and Electronic Engineering. In his senior year at BUP, he developed an interest in carbon-based nanomaterials. For his senior design project, he investigated the relationship between the Raman G peak and diameter of a carbon nanotube.

After completing his undergrad, he became a lecturer, which allowed him to stay in academia. While working as a lecturer, he simultaneously completed his Master of Science at Bangladesh University of Engineering of Technology (BUET). The most prestigious engineering university in Bangladesh, BUET has an acceptance rate of just 11 percent.

Rahman knew that continuing his academic career after graduating from BUET would not be easy. It was his dream to work in the field of semiconductor and surface science, a field that requires

a strong background and significant experience to secure admission to a university, especially one in the United States. He was drawn to ODU because he had heard that the engineering program was excellent and that high-tech lab facilities were available in the electrical and computer engineering department. He began his Ph.D. career in the Fall of 2013 when he was offered a graduate assistant position in the Applied Research Center laser lab. His first project was "Generation of multicharged ions by spark-discharged coupled laser ion source". Later he constructed a femtosecond pump-probe experimental set up to investigate the thermal property of thin-films under the supervision of Hani Elsayed-Ali, endowed professor and eminent scholar in electrical and computer engineering and director of the Old Dominion University research unit at the Applied Research Center in Newport News.

Rahman already works as a surface scientist for ASML in Connecticut, currently the largest supplier in the world of photolithography systems for the semiconductor industry. ASML is headquartered in Veldhoven, Netherlands and has over 23,000 employees representing more than 123 nationalities.

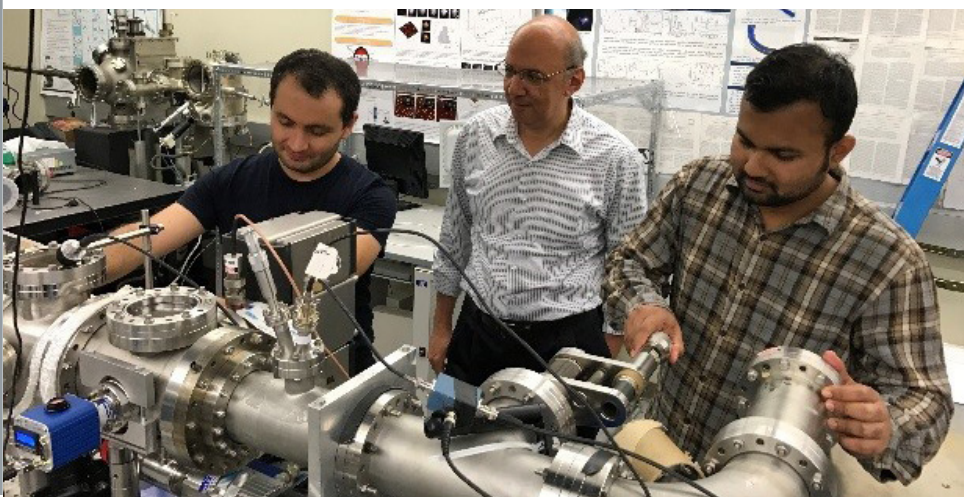


When asked about his time at ODU, Rahman said, "I would like to remember my early days at ODU. I have mixed feelings about those days. I was sad because I missed my parents and friends a lot. On the other hand, I was thrilled to find a lot of new friends and to get involved in group activities at ODU. I am very grateful to ODU international relationship and global monarch group for their support. I would like to thank my professor Dr. Hani, lab partners Oguzhan Balki, Haider Shaim and Nizam Sayeed for their help in my Ph.D. research. Without their help, it was never possible to finish my Ph.D.

I always feel an invisible connection with ODU. It was very difficult for me to leave all my ODU friends. ODU will be always my home."

*Matty Madden is a junior majoring in public relations*

*Mahmudur, right, working on the laser multicharged ion source in the Engineering Systems Building laser lab with lab partner Oguzhan Balki, left and advisor, Dr. Hani Elsayed-Ali, center.*



# Plasma scalpel takes on cancer

*A new tool enters a pivotal pilot study*

By Mark Peplow | *Scientific American* December 2019 Issue

**W**hen a surgeon removes a tumor, some cancer cells may get left behind, threatening to seed another malignant growth. Researchers have just begun the first clinical trial of a new anticancer tool that they hope will kill these stubborn cells: a plasma scalpel.

The pen-size scalpel emits a small jet of helium whose charged particles glow with a vivid lilac hue. An electrode at the scalpel's tip splits some of the helium atoms into a plasma soup of positive ions and electrons.

Unlike in the sun's blazing plasma, the scalpel's ions are relatively slow-moving—so the jet feels like a cool breeze to the touch. But its fast electrons are packed with energy and can convert atmospheric oxygen and nitrogen into reactive forms, including superoxide, nitric oxide and atomic oxygen. These substances can interrupt key metabolic processes and hamper cell reproduction, and researchers have found that cancer cells are much more vulnerable to such effects than healthy cells are. The scalpel can be used on a tumor site for just a few minutes during surgery, says Jerome Canady, a surgeon in Washington, D.C., and part of the team that developed the tool. "We just spray that area with plasma to kill any microscopic tumors," he says.

Cold plasma is already used to treat infections and sterilize wounds, and more energetic plasma can neatly cut or cauterize tissue. Turning it against cancer has long been a goal, and the new trial is a major milestone, says Mounir Laroussi, who studies the biological effects of cold plasma at Old Dominion University. "I think this is huge," he says.

In the past few years doctors have used plasma scalpels on three cancer patients on a "compassionate use" basis, after all other treatment options had failed. The plasma successfully killed residual cancer cells in these people, Canady says, but a full clinical trial will provide vital

data about safety and longer-term effects. As *Scientific American* went to press, Canady and his colleagues were due to perform the first surgery of their trial in late October 2019. They aim to use the plasma scalpel on 20 patients with late-stage solid cancers, including those affecting the pancreas, ovary or breast.

Laroussi says it took more than a decade of laboratory work on cell cultures and animals to prepare the plasma scalpel for the clinic. The process involved identifying the chemicals it generates, measuring their penetration into tissue and understanding how the disruption of cancer cells works. "You also have to stay below a certain dose—otherwise you kill both cancer cells and healthy cells," he says. Laroussi hopes the trial will show that the device can be fine-tuned to take out its cancerous quarry without causing unwanted damage.



*This article was originally published with the title "Plasma Power" in Scientific American 321, 6, 14-15 (December 2019)*



Laroussi

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