BECKMAN
FRIDAY FEATURE

Expecting Big Impact from Miniature Mass Spec

When Furman University Professor Mac Gilliland had two colleagues send him the call for applications from the Arnold and Mabel Beckman Foundation's Mass Spectrometry for Atmospheric Monitoring program, he almost didn't apply – despite it being a unique opportunity that seemed to fit his skillset and his collaborators' expertise perfectly. There were also concerns about time. But ultimately, Gilliland decided to go for it, motivated by the opportunity to get more undergraduates involved in high-impact research.

"I am passionate about undergraduate research and mentorship," he explained, "and I am already super proud of the students who have come through my lab. I also look forward to what future students will do!"

Mac Gilliland, Assistant Professor of Chemistry, and Mary Elizabeth Anderson, Professor of Chemistry, work in the chemistry lab with undergraduate student researchers at Furman University.
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Over the course of the project, 12 undergraduates at Furman will be involved, led by a team comprised of scientists from academia and industry, including fellow professor Dr. Mary Elizabeth Anderson who will be supervising the development of novel materials for VOC capture, and Drs. Kevin Schultze and Matt Aernecke from 908 Devices, Inc. who will be working to develop the high pressure mass spectrometry platform.

"I completed my PhD at UNC-Chapel Hill with Dr. Mike Ramsey, working on building miniature mass spectrometers for threat detection and cell growth monitoring," shared Gilliland. "After my PhD, I did two years of postdoctoral research in Dr. Angela Kashuba's lab under the direction of Dr. Eli Rosen, where we used mass spectrometry imaging to study the distribution of antiretroviral drugs in tissue and hair samples. I started my independent career at Furman in 2019, where our lab focuses on using mass spectrometry to solve chemical, biological, and environmental problems."

That all adds up to a well-qualified collaboration focused on building a miniature mass spectrometer based on high-pressure mass spectrometry technology. The team hopes the tech-

nology they develop will be used in a range of monitoring applications for volatile organic compounds (VOCs), from industry and hazard assessment to environmental monitoring. One of Gilliland's colleagues suggested another use for the platform: researching VOCs in floral communication. It wasn't something the team had originally envisioned, but they conceded that the impact of the technology may end up well beyond their initial expectations.

"We are very grateful to the Arnold and Mabel Beckman Foundation for the opportunity. We are excited to use and develop this technology for measuring volatile organic compounds in the air," Gilliland said. "Conventional mass spectrometers have large vacuum systems that limit their robustness and increase their size, weight, and power requirements. By operating at higher than conventional pressures, we can build a mass spectrometer that is much smaller, more robust, and more portable than conventional platforms."

It's a project that has everyone on the Furman team very excited and looking forward to getting things off the ground. ▪

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