DESIGNING SOLUTIONS WITH the Patient in Mind

BOSTON UNIVERSITY PROFESSOR **CATHERINE KLAPPERICH** USES BIOMATERIALS AND DIAGNOSTICS TO IMPROVE HEALTHCARE FOR WOMEN.

When Catherine Klapperich ('94) chose to attend Northwestern, her future seemed clear. As editor of her high school newspaper, she felt journalism was the right path—until she happened upon an engineering lab during a visit for prospective students.

"I went into Tech on a lark and saw a group of people looking at an environmental scanning electron microscope," she remembers. "They were literally watching cement dry, but the room was dark, and the pictures were really clear. The ability to see the contrast in the images attracted me. I became interested in engineering after just 10 minutes in a materials science lab."

Today, Klapperich is a professor of biomedical engineering and scientific director of the Design, Automation, Manufacturing, and Processes (DAMP) Laboratory at Boston University. Her innovative research focuses on developing medical devices for women's health, including diagnostic devices that can be used in low-resource settings and at the point of care.

MAKING AN IMPACT

After Northwestern, Klapperich earned a master's degree in engineering sciences from Harvard University and a PhD in mechanical engineering from University of California, Berkeley. As a PhD candidate, she became interested in how cells respond to different biomaterials and returned to UC Berkeley for postdoctoral research on the topic after working for a microfluidics company.

"At that time, the biomaterials field was the only place I could see where materials were being applied to human health," she says. "I liked being able to see the immediate impact of an engineered device that was designed for people to use."

Klapperich joined the Boston University faculty in 2003, attracted by the opportunity to work with clinical collaborators at the many hospitals in the Boston area. She distinguished herself in the area of diagnostics by creating portable devices for use in underserved communities. She also helped establish Boston University's COVID-19 Clinical Testing Laboratory through the BU DAMP Lab and currently serves as scientific director.

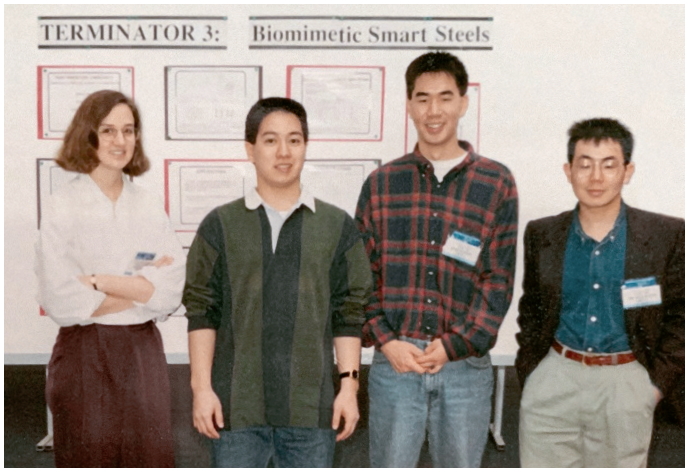
EMPOWERING WOMEN

As her research progressed, Klapperich observed that many medical devices for women were either originally designed for something else, not designed by women, or not designed with the specifics of the female anatomy in mind.

"These sex differences were not taken into account," she explains. "Often, women weren't involved in the design process. Bringing different viewpoints into design and creating diverse teams is central to my teaching on women's health."

She began making portable devices to detect sexually transmitted infections, which can cause fertility issues and future pathologies in women. "By making a portable device that can test in low-resource areas, you're putting something into the hands of people who need it," she says. "If it goes to the end of development, it should be in the drugstore, and you should be able to buy it and test yourself so that you have the power to make a decision about what to do next."

Designing products that empower women to make informed healthcare decisions motivates Klapperich. It has also educated her about many intersecting issues, including transgender women's health.



Klapperich, Edison Chu, Tom Yeh, and Dillon Fong (all '94) presenting their undergraduate project at the TMS Conference in San Francisco.

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"With menopause and perimenopause, we know a lot about adding hormones when hormones are decreasing, but what we don't know as much about is how those hormones affect a person's health in a global sense outside of menopause," she says. "When you replace hormones for someone who's transitioning, it's the same kind of therapies, but there's much less information available, so I have a number of projects in the space of monitoring hormones."

Another area of Klapperich's research focuses on using engineering automation to do large-scale cell culture of female reproductive tissues to facilitate research on female-specific health issues.

SHARING IDEAS

None of this would have been possible if Klapperich hadn't wandered into the Northwestern Engineering lab. "I knew it was going to be hard for me," she says. "I didn't have the same preparation as those who took advanced math and science in high school, but I stuck with it."

That experience laid the foundation for her research, where she applies what she learned at Northwestern every day. One of her favorite memories is living in the International Studies Residential College. "Meeting people from different countries really opened up my desire and ability to get out of my lab and share ideas with lots of people," she says.

Her gratitude inspires her to stay active in the University. She recently joined the McCormick Advisory Council, which she considers an honor. "Sparking collaborations and getting people to work together is important, so I'm glad to add my voice."

SARA LANGEN