# A BIG PUSH TO THINK SMALL: NANOTECH BOOM FITS UT-ARLINGTON LIKE A SECOND SKIN.

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RESEARCH TEXAS, INC.

ARLINGTON ■ Some couples get under each other's skin. But the husband-and-wife team of Donald Butler and Zeynep Celik-Butler takes it one step further. They're creating their own skin.

The electrical engineering professors at the University of Texas at Arlington are in the process of creating "smart skin," a series of microscopic sensors that can mimic and enhance various human senses.

It's all part of UTA's big push to think small. The campus has become a leading innovator in the exploding field of nanotechnology. This cutting-edge area of science is rapidly creating minuscule versions of cameras, computers, microchips, sensors and more.

"We've set our sights on being at the forefront of nanotechnology. It's part of our overall strategy to become a major player in science and research in the United States," says Dr. Ronald Elsenbaumer, UTA's vice president for research.

UTA's most visible commitment to nanotechnology was launched with the dedication of a Nanotechnology Research & Teaching Facility in 2001. The following year, UTA hooked up with a consortium of researchers at UT-Austin, UT-Dallas and Rice University. The consortium is known as SPRING — the Strategic Partnership for Research in Nanotechnology — and is dealing in research with the Departments of Defense, Energy and Homeland Security.

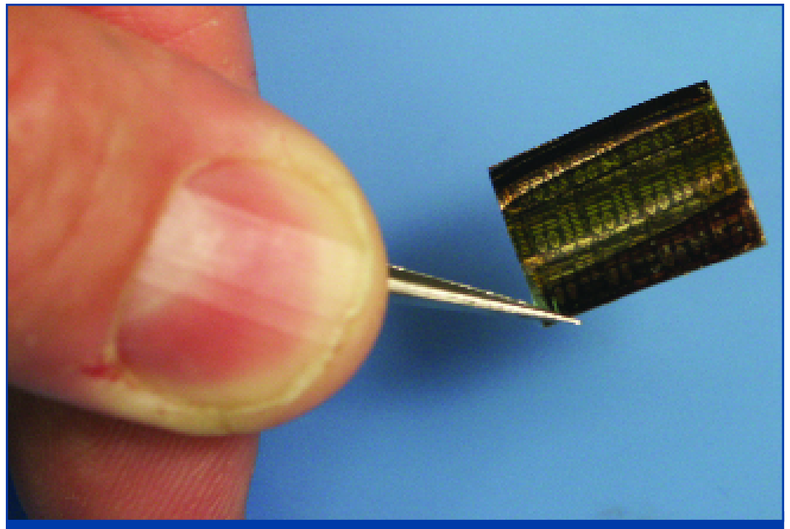
Which is where the Butlers and their research team come in. One series of microsensors in the "smart skin" could be used in detecting chemical attacks. Others could also be used to better keep soldiers safe by incorporating them into a soldier's clothing. Combat uniforms with the sensors could determine the position of a wound, trigger the activation of a pressure cuff to reduce blood loss and send a radio alert to medics.

The Butlers are part of a campuswide umbrella at UTA known as INSERT. The Institute for Nanoscale Science and Engineering Research and Teaching includes the labs and faculty of the colleges of science and engineering. INSERT coordinates the research efforts.

And in a bigger effort to think smaller, the nanotechnology arena is widening at UTA. Renovations recently resulted in a 50-percent increase in lab space to advance such work. Included in the expansion were the acquisition of a scanning electron microscope with sub-nanometer capabilities, a scanning tunneling microscope, and an electron beam lithography system. Renovations completed during time span between original version and now.

Other nanotechnology research at UTA includes:

- Noise and mobility degradation mechanisms in advanced high-k CMOS devices — finding solutions to a major hurdle in downscaling transistors.
- Valence-mended Si(100) surfaces for Si-CMOS nanoelectronics — creating dangling-bond-free semiconductor surfaces for higher speed, denser integration, simpler structures and lower power consumption.
- Micromachined infrared spectrometers — developing wearable, low cost, uncooled infrared detectors as early warning sensors.
- Inorganic solar cell elements for flexible substrates — designing highly efficient, wearable solar power generators.
- Novel photocatalysts for solar hydrogen generation — multi-centered metals facilitating electron storage and photogeneration of hydrogen from water.



A sample of "Smart Skin" with arrays of infrared sensors on a polyimide substrate.

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Professors Zeynep Celik-Butler and Donald Butler, formerly with Southern Methodist University, are now part of the growing team of researchers exploring the world of nanotechnology at UTA.