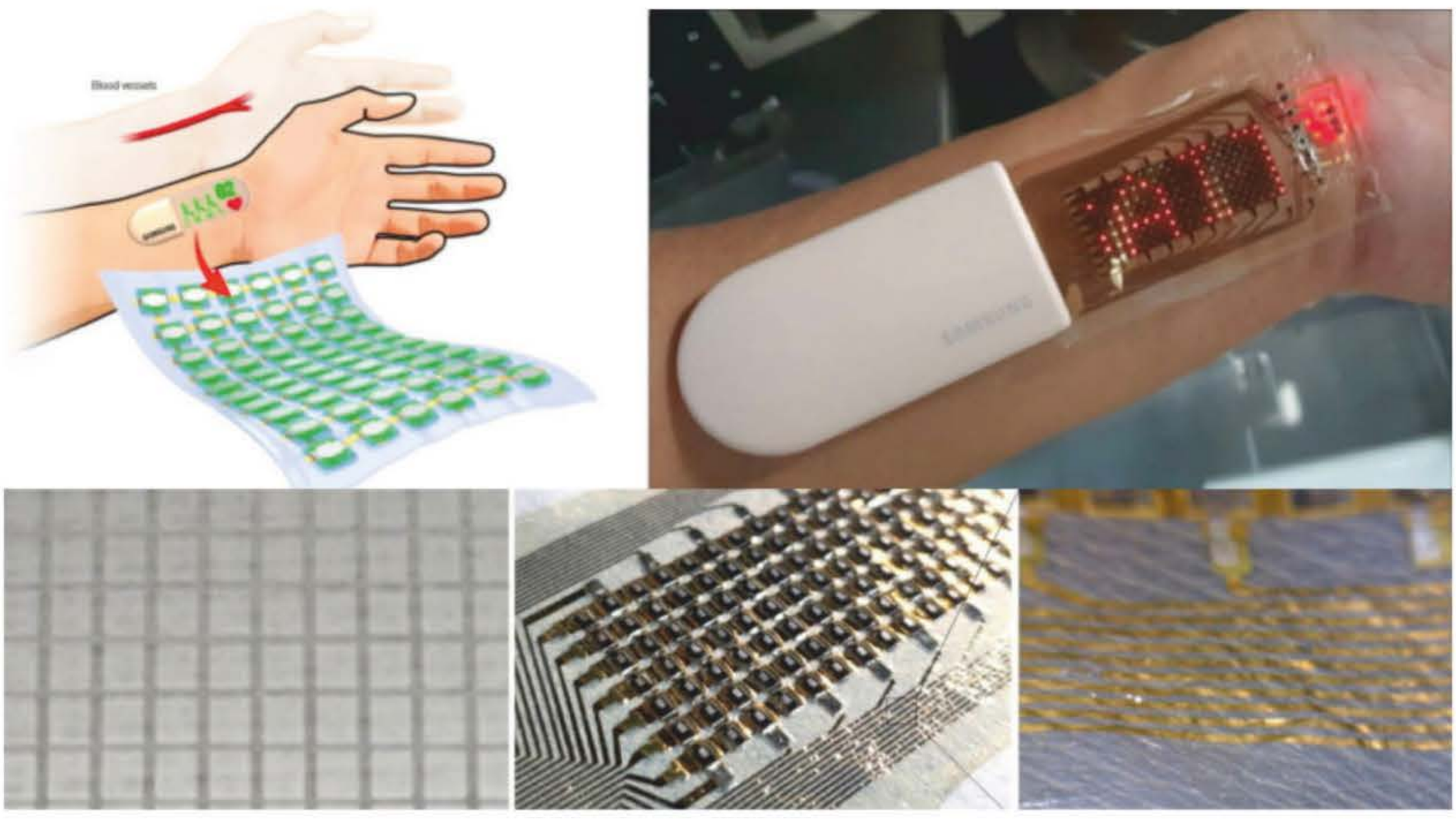
Samsung Develops a 'Stretchable Electronic Skin' OLED Display

BY MATTHEW HUMPHRIES



Samsung may be at the forefront of folding and sliding display technology, but the company's researchers have also been working on displays that can be stretched (with research happening even as far back as 2017), and we're beginning to see working prototypes.

In June, Samsung revealed a stretchable OLED display that acts as a heart rate sensor. The wrist-mounted device combines photoplethysmography (PPG) heart rate sensors and an OLED screen to offer real-time heartbeat monitoring.

The research team was able to stretch the device (to 30% elongation) 1,000 times without causing any damage while at the same time recording a heartbeat signal pickup that's "2.4 times stronger than would be picked up by a fixed silicon sensor."

The stretchable device, which Samsung refers to as "Stretchable Electronic Skin," was developed at the Samsung Advanced Institute of Technology (SAIT) in the Organic Material Lab by principal researcher Jong Won Chung, principal researcher Youngjun Yun, and staff researcher Yeongjun Lee.

"The strength of this technology is that it allows you to measure your biometric data for a longer period without having to remove the solution when you sleep or exercise, since the patch feels like part of your skin. You can also check your biometric data right away on the screen without having to transfer it to an external device," explained Yun. "The technology can also be expanded to use in wearable healthcare products for adults, children, and infants, as well as patients with certain diseases."

The key to unlocking electronic devices that can cope with stretching is to replace plastic parts with an elastomer, which offers elasticity and resilience while being compatible with existing semiconductor manufacturing processes. Elastomers are susceptible to heat, but this was overcome by strengthening the material's thermal resistance "by tailoring its molecular composition."

The fitness trackers and health monitors we wear today are solid objects we regularly need to remove—smartwatches, for example—and offer limited monitoring performance. Moving to stretchable versions allows for "close adhesion to the skin," which means enhanced monitoring and a more comfortable experience you may even forget is being worn. Think of future health monitors as more like adhesive bandages than worn accessories.

"Our research is still in the early stages, but our goal is to realize and commercialize stretchable devices by increasing system resolution, stretchability, and measurement accuracy to a level that makes mass production possible," explained Chung. "In addition to the heartbeat sensor that was applied in this test case, we plan to incorporate stretchable sensors and high-resolution freeform displays to enable users to monitor things like peripheral oxygen saturation, electromyogram readings and blood pressure."