

Transient Electronics Could Dissolve Inside Your Body

Chips made of extremely thin silicon could go into your body to kill bacteria or deliver drugs and then dissolve harmlessly when they're done. They could also open up new possibilities in espionage.

Researchers from Tufts, Northwestern, and the University of Illinois at Urbana-Champaign have pulled off a disappearing act for electronic devices that could change the way we think of our gadgets, as well as introduce new capabilities for medical implants and even spy gear.

The technology, which will be announced in a paper this week in *Science*, is called transient electronics or resorbable electronics. These systems work until they are no longer needed, at which point they dissolve completely away – the dissolution triggered by ordinary water in their operating environment. The most immediate application envisioned by the developers is for medical devices that dissolve in the human body a set period of time after surgeons implant them.

"This is a completely new concept," said Yonggang Huang, who leads the theory, design, and modeling team for the project at Northwestern University, in a statement released by the university.

The new electronics are silicon-based, just like conventional electronics. The trick to getting them to dissolve in water is to make the silicon extremely thin, according to John Rogers, the University of Illinois at Urbana-Champaign professor who heads up the project. "Silicon dissolves at a rate of about 1 nanometer per day in the body," Rogers tells PM. For a standard integrated circuit wafer, says Rogers, dissolution would take 1000 years. But a 20-nanometer-thick silicon chip, the size that the researchers created, can disappear in just a couple of weeks.

The researchers formed the wires and other metal parts needed to create electronic devices from magnesium, a bio-friendly metal already used in medical devices such as stents. Magnesium has the added benefit of also dissolving in water, and here, too, thin components make the disappearing act possible. For power the devices rely on induction coils rather than potentially toxic, nonresorbable batteries.

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