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## Silk-Silicon Implantable Electronics Conform to Tissues, Then Melt Away

By [Clay Dillow](#) Posted 11.03.2009 at 1:15 pm



**Silk-Silicon Electronics** Silk substrates fitted with ultra-thin silicon transistors can be implanted to conform to the body's tissues, opening the door for enhanced implantable medical devices of various uses. The silk dissolves harmlessly overtime, leaving the silicon circuitry behind (the orange liquid in the photo is a disinfectant used during the implanting procedure). *Rogers/Omenetto*

Implantable electronics like pacemakers are old hat, but these kinds of implants are limited by the fact that they must be encased to protect them from the body, and vice versa. But in the quest to make our bodies ever more bionic, researchers have now developed implantable silicon-silk electronics that almost dissolve completely inside the body, leaving behind nanocircuitry that could be used for improved electrical interfaces for nervous system tissues or photonic tattoos that display blood-sugar readouts on the skin's surface.

Most electronics must be "canned," or encased so they don't trigger irritation inside the body, and also so the body doesn't interfere with the device's performance. But by building an array of one millimeter-long, 250 nanometers-thick transistors on a thin silk substrate, the researchers have demonstrated that their circuitry is thin enough fly under the body's immune reaction radar.

The silk-silicon stamp can be laid directly onto biological tissue, like muscle or even brain matter. Wetting the silk causes the structure to conform to the shape of the tissue, blending it seamlessly with the body's natural designs. The silk then dissolves harmlessly over time, leaving behind a layer of working silicon circuits too thin to cause irritation.

The researchers, which hail from a handful of institutions including the University of Pennsylvania and the University of Illinois at Champaign-Urbana, are now tinkering with electrodes built on silk to serve as interfaces for the nervous system. Existing electrodes, employed in procedures like deep-brain stimulation in Parkinson's patients, generally sit atop or sometimes pierce the tissue. Arrays of silk-implanted electrodes could integrate better with biological tissues, conforming to the brain's canyon-esque architecture to reach regions that were previously inaccessible.

The technology could also enhance a variety of existing medical devices that now require "canned" circuitry. Enhanced neurological implants could improve prosthetic device control, and the group is developing LEDs that could act as photonic tattoos that would relay information from inside the body to the surface of the skin. While we're likely a ways away from customizable LED tattoos of the artistic, cosmetic variety, it's an interesting thought; and who knows, they may be closer than we think. One of the more convenient aspects of silk-silicon electronics is that silk is already FDA-approved for implants, potentially sidestepping a lengthy approval process.

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### 7 COMMENTS



[Brian P.](#)

11/03/09 at 3:10 pm

Brian P.

I can hardly wait till they get a computer thats implantable. Think of how nice it would be to access google, wikipedia, or popular science right from your own brain!

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[sirknala](#)

11/03/09 at 5:05 pm

OR... telepathic communications with implanted cell phones!

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scigeek96

11/03/09 at 8:50 pm  
an actual wrist watch

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spartacus613

11/03/09 at 9:41 pm  
Spart: think the best would be to implant a device that interfaces with the brain so when you put on something like a bluetooth headset on the headset reads the implant and sends what you're thinking to the computer which executes the command....(with that you could type whole reports and essays in seconds, or use your subconscious to do physics problems that would take hours by hand but your brain does in milliseconds)

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animemaster

11/03/09 at 10:44 pm  
LEDs are a lame use for brain ports on paralyzed people or glucose meters on diabetics or a tongue shocking grid to display data to sight-impaired people. All of which would be charged overnight by induction and communicate to your Android phones over blue tooth. Yayness!

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chieffranky

11/04/09 at 1:37 pm  
I just want to check my webcomics via my palm tattoo.

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extremechiton

11/05/09 at 12:44 am  
telepathy: technology exists, just no one has tried to put the equipment together.  
  
materials: brain control interface. wifi connection.  
the brain control interface converts brainwaves to radio waves so what you think can be decoded by a computer. and since most computers have internet connection, the wifi can be used to put your thinking in to the global database as text.  
  
if you attach a cell phone to the bci, just think of the number you want to call and it will call it. then the person you call will also have a bci that will convert radiowaves into brain waves so you can hear or rather think of the thoughts that the other person sent.  
  
and if tagged into memory, you can send pictures, or video.  
  
perhaps you can see live, what the other person is seeing through the eyes of that person, and hear what they hear. o.o

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