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19 Apr 2010

FirstScience News

Provided by EurekAlert!

A brain-recording device that melts into place

- 18 Apr 2010

By NIH/National Institute of Neurological Disorders and Stroke

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Recently, the team described a flexible silicon device for recording from the heart and detecting an abnormal heartbeat.

In the current study, the researchers approached the design of a brain implant by first optimizing the mechanics of silk films and their ability to hug the brain. They tested electrode arrays of varying thickness on complex objects, brain models and ultimately in the brains of living, anesthetized animals.

The arrays consisted of 30 electrodes in a 5x6 pattern on an ultrathin layer of polyimide – with or without a silk base. These experiments led to the development of an array with a mesh base of polyimide and silk that dissolves once it makes contact with the brain – so that the array ends up tightly hugging the brain.



Next, they tested the ability of these implants to record the animals' brain activity. By recording signals from the brain's visual center in response to visual stimulation, they found that the ultrathin polyimide-silk arrays captured more robust signals compared to thicker implants.

In the future, the researchers hope to design implants that are more densely packed with electrodes to achieve higher resolution recordings.

"It may also be possible to compress the silk-based implants and deliver them to the brain, through a catheter, in forms that are instrumented with a range of high performance, active electronic components," Dr. Rogers said.

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The study received support from NINDS, NIH's National Institute of Biomedical Imaging and Bioengineering (NIBIB), the U.S. Department of Energy's Division of Materials Sciences, the U.S. Army, the Defense Advanced Research Projects Agency (DARPA), and the Klingenstein Foundation.

NINDS (www.ninds.nih.gov) is the nation's leading funder of research on the brain and nervous system. The NINDS mission is to reduce the burden of neurological disease – a burden borne by every age group, by every segment of society, by people all over the world.

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Reference: Kim et al. "Dissolvable Films of Silk Fibroin for Ultrathin Conformal Bio-Integrated Electronics." *Nature Materials*, published online April 18, 2010.

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