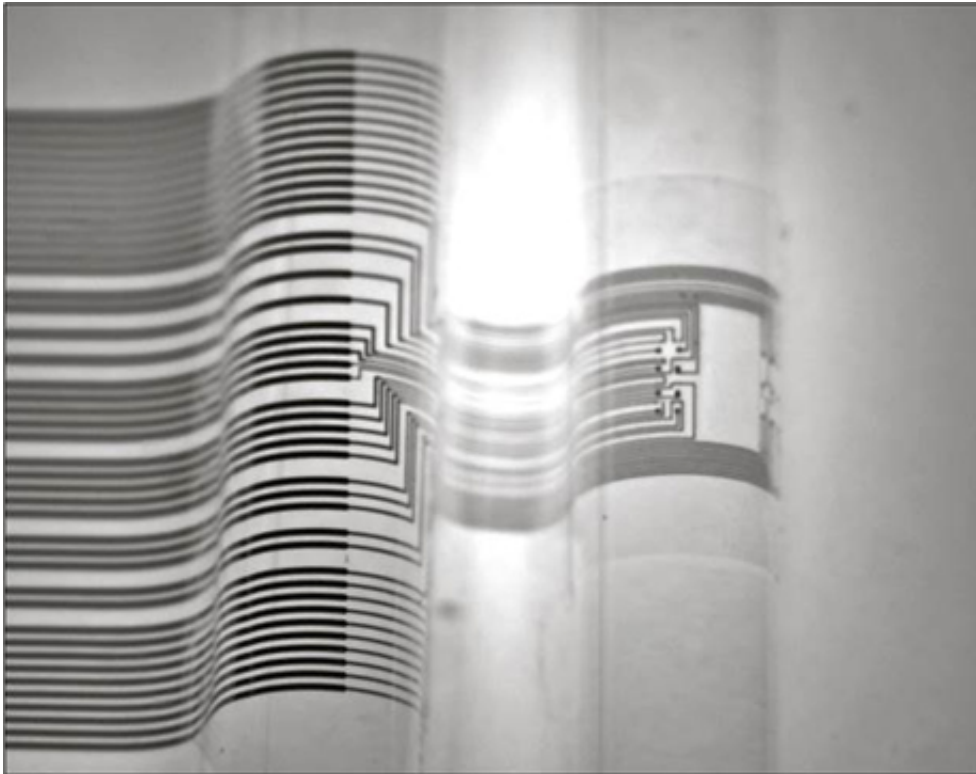


# Micro transistor prototypes map the mind

April 12 2013, by Blaine Friedlander

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This micro transistor can now obtain high-quality amplification and brain-signal recording better than ever before. A French scientific team used the Cornell NanoScale Science and Technology Facility to develop the prototypes. Credit: Department of Bioelectronics, Ecole des Mines

(Phys.org) —To make better mind maps, a group of French scientists – building on prototypes developed at the Cornell NanoScale Science and Technology Facility (CNF) – have produced the world's first microscopic, organic transistors that can amplify and record signals from

within the brain itself.

Helping patients and doctors alike, this is a substantial, 10-fold improvement in signal quality compared with current electrode technology.

In epileptic patients, recordings help to scout [brain regions](#) responsible for seizure genesis. For patients with [brain tumors](#), recordings help to chart the brain for tumor removal. In addition, electrical recordings of neuronal activity are being used in brain-machine interfaces to help paralyzed people control prosthetic limbs.

High-quality recordings of brain activity – challenging at best – need to be carefully amplified, but today's amplifiers are bulky and placed outside the skull, where the signal degrades. These new biocompatible, microdevices are flexible enough to go inside the brain and follow the curvilinear shape of the [brain surface](#).

To develop the prototypes, the scientists used the CNF lithography and characterization suite of tools – which validates never-before-used concepts. The staff's experience converted initial designs into real devices quickly.

"To understand how the brain works, we record the activity of a large number of neurons. Transistors provide higher-quality recordings than electrodes – and, in turn, record more neuronal activity," said George Malliaras of the Microelectronics Center of Provence, France, and a lead author on the research. "The CNF prototyping allowed us to skip having to reinvent the wheel and saved us precious time and money."

The study, "In Vivo Recordings of [Brain Activity](#) Using [Organic Transistors](#)," was published in *Nature Communications*, March 2013.

Provided by Cornell University

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