# Tiny electronic chip provides big boost to treat hundreds of millions with brain and central nervous system disorders

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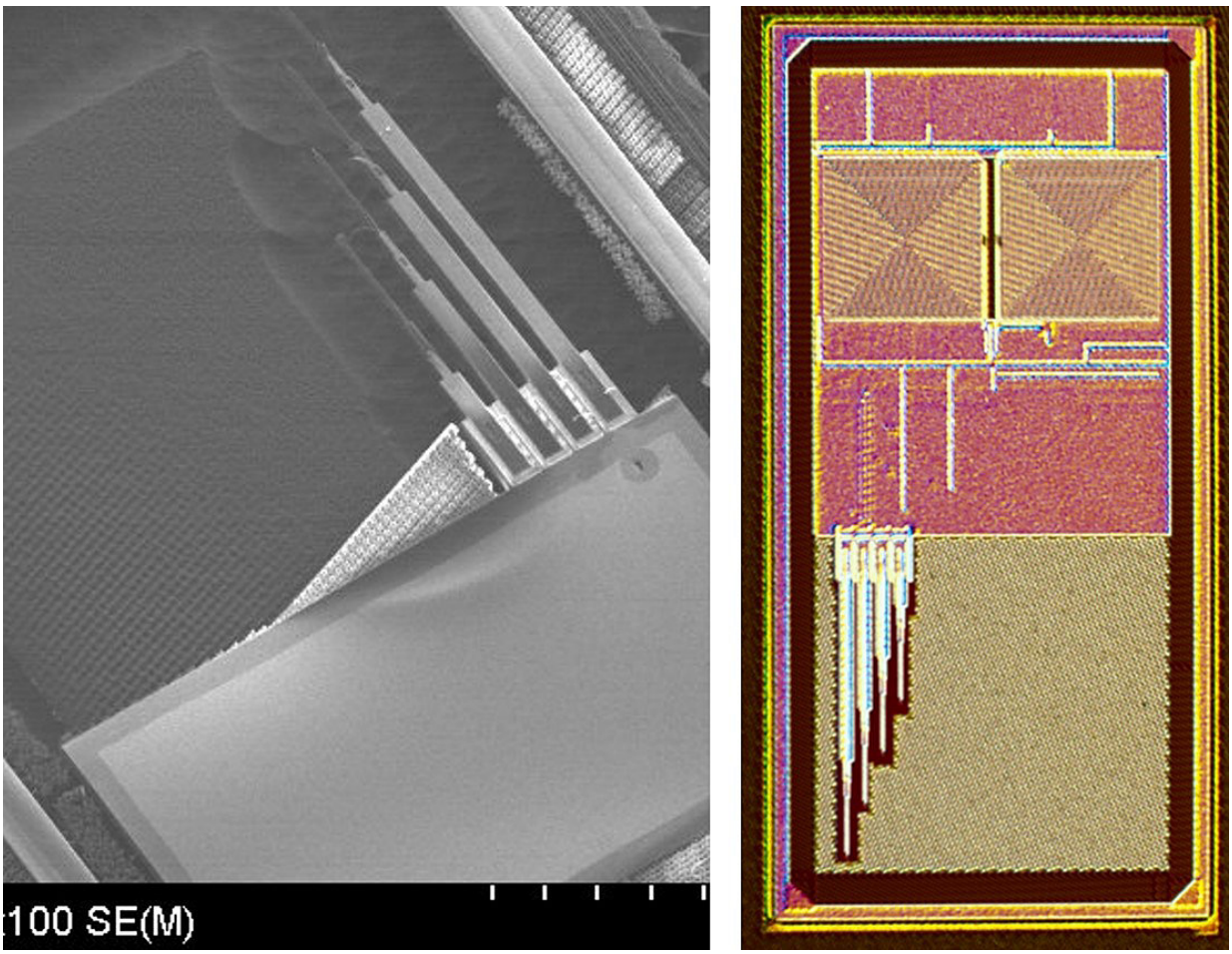


These figures show pre- and post-fabricated wireless neural probes chip micrograph. Purdue University researchers developed an electronic chip that can read signals from several nerve endings and wirelessly transmit them without needing a battery or any other off-chip component. Credit: Purdue University

Purdue University researchers have created an electronic chip that may provide improved support for the hundreds of millions of people worldwide the World Health Organization says are affected by neurological disorders.

The Purdue researchers developed an electronic chip that can read signals from several nerve endings and wirelessly transmit them without needing a battery or any other component. Energy is created by an on-chip antenna similar to the technology used to wirelessly charge smartphones.

"This invention opens up even greater life-saving research into understanding the brain and central nervous system, various neural diseases and neuro-prosthetics," said Saeed Mohammadi, an associate professor in Purdue's School of Electrical and Computer Engineering, who helped lead the research. "Our breakthrough is that this chip is very small, about the size of a piece of dust, and can be made flexible for future brain implant applications."

The electronic chip integrates with neural sensors and uses a remotely powered electronic system to wirelessly transmit the brain signals to a computer. The system provides support for people with neural deficiencies and those with severed nerves.

"The main challenges are to operate such a wireless neural interface system with a small and flexible chip at very low power and yet high data rate," Mohammadi said. "We need a high data rate to be able to read signals from thousands of neurons using a single implant chip. At the same time, we need to operate the system at very low power for safety and size reasons."

Purdue's innovative low-power circuit design is created using a typical electronic chip received from a semiconductor manufacturing company that is then processed at the university to carve out the microelectrodes for the neural interface system.

"We can perhaps provide a technology that is more bio-compatible with brain tissues and can be implanted in the human brain or at nerve endings with much better success rate," Mohammadi said.

Provided by Purdue University

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