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Neural Interface Assembly and Method for Making and Implanting the Same

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Inventors

Jiping He, PhD
Professor
Harrington Dept of Bioengineering
Arizona State University

Gregory B. Raupp, PhD
Dir, FA (FSC)
Ofc Of Vice Pres Research / Economic Affairs
Arizona State University

Stephen P. Massia, PhD
Associate Professor
Harrington Dept of Bioengineering

Amarjit Singh, PhD
Adjunct Faculty

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Contact

Jack Geltosky, PhD
Senior Vice President of Business Development,
Life Sciences
Arizona Technology Enterprises, LLC (AzTE)
P: 480.884.1989
F: 480.884.1984
JGELTOSKY@AZTE.COM

Invention Description

The promise of advanced neuroprosthetic systems to improve the quality of life for the deaf, blind, paralyzed, or other handicapped individuals hinges on the development of a safe and effective neural interface for the central nervous system. Existing devices are typically made from photolithographed or micromachined silicon which tend to be stiff, bulky; and the recording quality substantially diminishes over relatively short periods of time. Accordingly, there is a tremendous need for a reliable, flexible, and long-term neural interface which can be implanted and maintained with relative ease.

Researchers from Arizona State University have developed a new multichannel implantable electrode device. Termed the Octopus electrode, the device is fabricated on a flexible polymeric material with an array of dendrites protruding from a single ribbon like tail. Each dendrite can accommodate 4-6 recording/stimulating sites and the device can accommodate 6-8 dendrites for a total of 24 to 48 channels of recording capability. The tip of each dendrite is bendable and can be stiffened either temporarily or permanently for precise positioning. This technology is an important development that will help move the neuroprosthetic systems industry forward. The device may also have non-cranial implantable device applications.

Potential Applications

This technology can be used for a variety of applications involving neuroscience and neuroprosthetics.

- **Basic neuroscience research –** neuron function analysis / signal injection
- **Brain / Machine interface research -** Used to develop neuroprosthetic solutions to treat difficult central nervous system problems.
- **Long-term cerebral cortex monitoring and / or stimulation**

Benefits and Advantages

- **Versatility** – Can accommodate both vertical and horizontal motion of the brain tissue relative to the skull which is not allowed with stiff structured electrodes.
- **Adaptability** – The position and depth of each leg can be determined at time of insertion giving clinicians more control.
- **Improved surgical handling and reliability**– Superior design allows multiple legs to share a single connection ribbon which provides both a surgical anchor and a reliable connection to external devices.