INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Probes with Deployable Sites

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Hardware
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OVERVIEW

Advanced neural probes with deployable sites for improved long-term functionality

- Minimizes immune response and maintains neuron interaction
- Intracortical recording, cochlear implants, retinal prostheses, muscle stimulators

BACKGROUND

The connection between electrical interfaces and biological tissue is crucial for recording biological signals, stimulating nerves/muscles, or delivering drugs. Traditional probes, often needle-like, are used in various tissues like the central nervous system (CNS), cochlea, retina, and muscles. These probes, typically made of materials such as silicon or polymers, guide signals or drugs between recording/stimulation sites and the backend. However, existing designs face problems like chronic stability, reliable insertion, and tissue damage. Continuous use in clinical settings is hindered by immune responses forming scar tissue around the implanted probes. The scar tissue elevates impedance and hinders stable signal exchange. Therefore, an improved probe design is needed to bypass these issues, enhancing long-term efficacy and reducing tissue damage.

INNOVATION

This new probe design addresses chronic neural recording issues by integrating mechanical actuators into the probe shank, enabling deployable recording sites. Before implantation, these

sites are protected close to the shank. Post-implantation, the mechanical actuators displace the sites far from the shank, reducing immune responses and improving tissue interaction. Deployment ensures less tissue damage by maintaining proximity to neurons and minimizing motion-induced damage. These probes can be used in applications like ECoG arrays, cochlear and retinal implants, and muscle stimulators, enhancing their functional longevity. The actuators can be realized using thermal, piezoelectric, or chemical mechanisms, providing sufficient force to safely move the sites through nervous tissue and maintain their position, offering a stable, long-term interface.

ADDITIONAL INFORMATION

US9265465 "Probes having deployable sites and methods for making the same"