

TECH OFFER

Flexible Neural Probe for Brain Activity Monitoring and Mapping



KEY INFORMATION

TECHNOLOGY CATEGORY:

Electronics - Sensors & Instrumentation

Healthcare - Diagnostics

Healthcare - Medical Devices

TECHNOLOGY READINESS LEVEL (TRL): **TRL9**

COUNTRY: **SOUTH KOREA**

ID NUMBER: **TO174910**

OVERVIEW

Neural probes are used for capturing electrical activities and for exploring functional connectivity in the brain. For neural probes to be effective and be able to capture the activities happening at the scale of neural cells in vivo, they need to be small, made of bio-compatible material, and ideally, be flexible. This ensures that they do not trigger an inflammatory response or have a risk of breakage.

The technology presented here covers the requirements stated above for an ideal neural probe. The probes are flexible and allow superior precise targeting even with movement. The technology employed also avoids breaking and micromotion during the in-vivo trials. The probe's design is also customizable for different requirements and can support combination of single/dual side, linear/tetrode, recording/stimulating/mixed and single/multi shank configurations for differing use cases. The probes can support up to 32 channels and provide multiple connectivity options for integration.

TECHNOLOGY FEATURES & SPECIFICATIONS

The probe has 8 to 32 nano-scale electrodes coated in biocompatible high-polymer materials. Its customizable channels can capture neural activities precisely and effectively in the electrochemical pool where neurons combine and communicate. Because of its nano-scale size, it can access the inner brain, such as the laboratory mouse's hippocampus and motor cortex.

The company also has expertise in making durable biomaterial circuit boards. The neural probe is built upon a flexible printed circuit board (fPCB), so the user does not have to worry about neural probe breaking inside the brain tissue.

The following are some key technical features of the probe:

Probe physical size:

- Length : 12mm + 5mm (Shank)
- Width : 5.5mm to 20.5mm (Depends on number of channels)

Shank size:

- Width : 153um
- Thickness : 60um
- Length : 5mm
- Multiple shanks

Electrode size:

- Diameter : 20 um
- Distance between electrode: 50um
- Type: Linear, Tetrode
- Layer: Single side, Double, side

Channels & adaptors:

- Channels : 8 to 32
- Adaptors : Dip, Pin and Omnetics

POTENTIAL APPLICATIONS

The technology is suitable for applications in the field of medicine, bioengineering and neuroscience. The flexible probe can be used as a part of a more robust and precise measurement setup for monitoring and/or stimulating neural activity. The neural probe can safely be used in any current application requiring neural recording in in vivo or in vitro environment.

UNIQUE VALUE PROPOSITION

The technology offers a flexible neural probe which is customizable for use in different scenarios and experiments requiring neural monitoring and excitation. The main advantages of the technology can be summarized as:

- **Flexible** – The neural probe is made of a polymer film and not the traditional brittle silicon material. This is accomplished using advanced fPCB engineering. This also allows safe neural recording for in vivo and in vitro experiments.
- **Configurable** – The solution, in its current form, provides an easy way to connect the neural probe into any existing neural recording interface. The company provides various types of connectors and an option to customize these based on end- user’s request.
- **Economics** – Aside from the different connectivity options, multiple existing configurations are available which help end user avoid the use of devices like a tetrode twister. This reduces the initial expenses for labs and companies trying out new configurations.
- **Adaptable** – The probe can be used in diverse scenarios spanning deep brain stimulation to hippocampal neural recording.
- **Customizable** – The probe design supports configurations involving multiple shanks and channels.
- **Biocompatibility** – The probe is biocompatible and suitable for in vivo experiments.
- **Accuracy** – The probe can detect neural spikes more accurately, collect cell clusters and track them reliably. The design also ensures that the neurons in contact around the probe’s micro scale shank can survive and act normally.