Request Information

Permalink

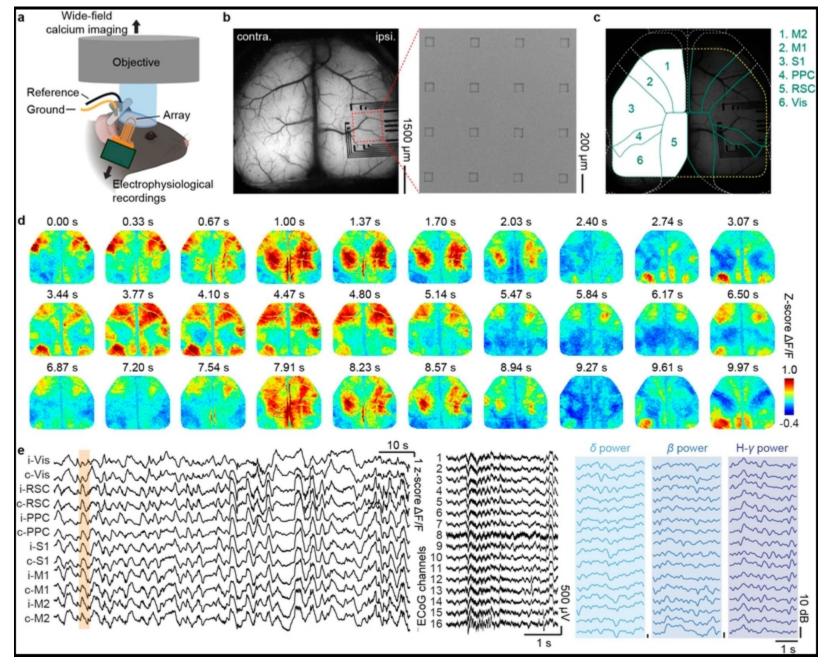
(SD2022-177) Flexible, insertable and transparent microelectrode array to detect interactions between different brain regions

Tech ID: 33395 / UC Case 2021-Z08-1

ABSTRACT

Researchers from UC San Diego's Neuroelectronics Lab invented an implantable brain electrode technology which allows recording interactions between different cortex regions or interactions of cortex with other subcortical structures. The technology is called Neuro-FITM. Flexibility and transparency of Neuro- FITM allow integration of electrophysiological recordings with any optical imaging (such as high resolution multiphoton imaging) or stimulation technology (such as optogenetics).

TECHNOLOGY DESCRIPTION



CONTACT

Skip Cynar scynar@ucsd.edu tel: 858-822-2672.



OTHER INFORMATION

KEYWORDS

Brain machine interfaces, implantable medical devices, electrophysiology, large-scale brain activity, neural decoding, neural network, wide-field imaging

CATEGORIZED AS

- Medical
 - Disease: Central Nervous
 System
 - Research Tools
- ▶ Nanotechnology
 - ▶ Electronics

RELATED CASES

2021-Z08-1

ADVANTAGES

1) <u>Transparency</u>: Optical transparency is important for seamless integration of electrophysiological recordings

and optical imaging in multimodal experiments. That integration allows recording brain activity across very

large areas in multiple spatial and temporal scales.

2) Flexibility: The high flexibility of Neuro-FITM allows bending of the probe shank away to lower the

microscope objective for two-photon imaging, whereas the rigid shanks of the state of the art neural

electrodes such as Neuropixel and NeuroNexus probes prevent lowering of the microscope objective to its

working distance. Wide-field microscope images show that NeuroNexus and Neuropixel probes block the field

of view and generate shadows.

3) Shuttle-free implantation: Vertical implantation of Neuro-FITM arrays is critical for not blocking the light

pathway during optical imaging and minimizing implantation damage. To implant Neuro-FITM arrays vertically

without using a rigid shuttle or adding a bioresorbable stiffening layer, we carefully engineered the geometry

and length of the microelectrode array by performing mechanical analysis to prevent buckling during

insertion. Furthermore, the probe was designed to include additional micromanipulator pads to maximize

insertion force against buckling.

STATE OF DEVELOPMENT

INTELLECTUAL PROPERTY INFO

Patent-pending: US Patent Application No.18,063,040 on 12/07/2022 FLEXIBLE,

INSERTABLE, TRANSPARENT MICROELECTRODE ARRAY FOR DETECTING

INTERACTIONS BETWEEN DIFFERENT BRAIN REGIONS

RELATED MATERIALS

▶ Transparent Brain Implant Can Read Deep Neural Activity From the Surface (News Release. January 11, 2024) - 01/11/2024

Liu X, Ren C, Huang Z, Wilson M, Kim JH, Lu Y, Ramezani M, Komiyama T, Kuzum D. Decoding of cortex-wide brain activity from local

recordings of neural potentials. J Neural Eng. 2021 Nov 15;18(6). - 11/15/2021