Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

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Fluoroacoustic Multipipette Electrodes (FLAME)

Current limitations in optical imaging depth and cellular identification limit high resolution in vivo recording of different regions throughout the brain. Light delivery probes are often used for deep brain illumination to acquire spatiotemporal neuronal activity. However, these probes are still unable to perform recordings of cellular activity with high temporal resolution, primarily due to their material properties.

Researchers at Arizona State University have developed a novel tool which incorporates light with acoustics to navigate to specific cells types at unprecedented depths and resolutions. This platform tool, the fluoroacoustic multipipette electrode (FLAME), enables scalable and automated deep brain neuronal targeting. It shows spatiotemporal activity patterns within the neurocircuitry to facilitate precise modulation and high-resolution imaging and recording of cells deep within the living brain.

FLAME provides a valid and reliable foundation to target select cells deep in the brain, modulate neuronal activity, and record electrical signals from multiple neurons within a single circuit to enable transformational discoveries in neuroscience.

Potential Applications

- Target, modulate and record cellular function in the brain
  - Better characterization and understanding of complex neuronal interactions
- Deep brain circuit navigation and analyses
- Studying how addiction affects the brain at a cellular level
  - Could be used to develop preventative medicines and treatments for addiction
- Studying neurological diseases and disorders at the cellular level

Benefits and Advantages

- Increased neuronal targeting depth (<1 mm depth)
- Able to emit and detect across a wide range of fluorescence to improve targeting, modulating and recording from a broad class of probes
  - Avoids complex and costly equipment
  - Reduces autofluorescence
  - Minimizes scattering
- Fully integrated system for deep brain cellular identification, modulation and high-resolution recording
  - Real-time photoacoustics a, fluorescence and scalable, multi-cellular electrophysiology
- Independent robotic automation
  - Enables parallel system control at the point of targeting without the need for external imaging equipment

For more information about this opportunity, please see

News Article - 2020

For more information about the inventor(s) and their research, please see

Dr. Smith's departmental webpage