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## Immobilization Devices for Biological Tissues

Tech ID: 34676 / UC Case 2025-954-0

### BACKGROUND

Organoid/brain slice immobilization for microelectrode arrays (MEAs) and organoid-on-chip platforms have traditionally depended on hydrogels, harp-style grids, or microfluidic confinement, each with its own set of pros and cons with respect to stability, standardization, and impact on electrophysiology. Hydrogels (e.g., Polyethylene glycol or PEG, extracellular matrix like Matrigel) are widely used to immobilize 3D neural tissues on MEAs. These are known to swell, drift, and alter mechanical microenvironments, which in turn modulate network firing, synchrony, and bursting behavior. Mechanical retention via harp slice grids or similar harp devices is a long-standing practice in acute brain slice and organoid electrophysiology. These devices are typically standardized, fragile, and poorly matched to diverse well and tissue geometries. Microfluidic organoid chips and specialized 3D MEAs (e.g., e-Flower, organoid-on-chip platforms) have recently emerged to enable hydrogel-free trapping/encapsulation of organoids for imaging and recordings, but they often require bespoke chip designs and overly complex flow control setups. There is a lack of geometry-agnostic devices for mechanically immobilizing diverse organoids on commercial MEAs that feature consistent stability, uniform and/or tailored contact, and with minimal perturbation of electrophysiological readouts.

### TECHNOLOGY DESCRIPTION

To help address these challenges in organoid immobilization, researchers at UC Santa Cruz (UCSC) have developed a new modular mechanical retention device that decouples the immobilization function from biochemical scaffolds, using a rigid external scaffold plus internal microscale mesh specifically shaped to constrain 3D samples in all translational and rotational axes without adhesives or gels. Unlike fixed-dimension harp grids, UCSC's "BioNets" are platform-oriented yet reconfigurable geometries (i.e., scaffold footprint and mesh pattern) which are designed to conform to standard MEA well layouts (e.g., MaxOne/MaxTwo) while still being adaptable across substrates and tissue morphologies. The microscale mesh plus external scaffold effectively and mechanically constrains the 3D tissues in all translational and rotational axes without the need for hydrogels or adhesives. BioNets have been demonstrated in chronic MEA recordings in human cortical organoids, resulting in preserved and robust electrophysiological activity under desirable immobilization boundaries.

### APPLICATIONS

- ▶ diagnostics - neuro
- ▶ therapeutics - neuro
- ▶ research tools - neuro

### FEATURES/BENEFITS

- ▶ Improves positional stability and registration on MEAs while avoiding common swelling, variability, and diffusion barriers.
- ▶ Repeatable fit across different MEA and culture formats.
- ▶ Supports chronic and high-throughput workflows under standard sterilization protocols.
- ▶ Customizable, platform-matched scaffold geometry, with interchangeable mesh designs.

### INTELLECTUAL PROPERTY INFORMATION

Patent Pending

### RELATED MATERIALS

### CONTACT

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### INVENTORS

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### OTHER INFORMATION

#### KEYWORDS

microelectrode array, microelectrode arrays, MEA, MEAs, organoid, organoids, immobilization, scaffold, scaffolding, mesh, brain slices, 3D tissue, hydrogel, electrophysiological, electrophysiology, immobilize, e-Flower, well, organoid immobilization, organoid retention

#### CATEGORIZED AS

- ▶ **Medical**
  - ▶ Disease: Central Nervous System
  - ▶ Research Tools
  - ▶ Screening
- ▶ **Research Tools**
  - ▶ Other
  - ▶ Screening Assays
- ▶ **Sensors & Instrumentation**
  - ▶ Process Control
  - ▶ Scientific/Research
- ▶ **Engineering**
  - ▶ Robotics and Automation

#### RELATED CASES

2025-954-0

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Modern Organoid Research Platform System and Methods](#)
- ▶ [Organoid Training System and Methods](#)

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