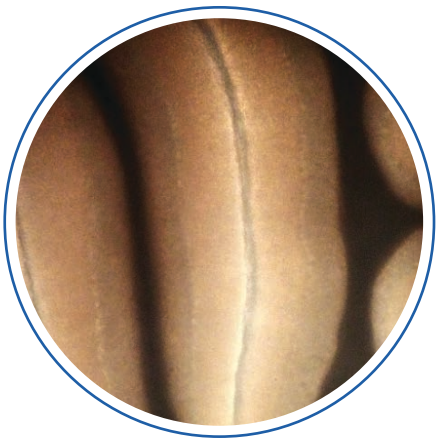
maxwell BIOSYSTEMS

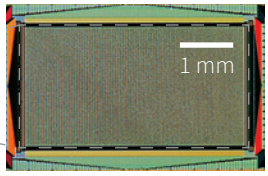
Every Cell Counts.

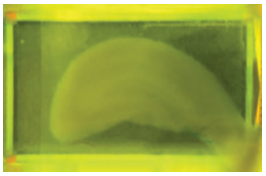
MaxOne for Brain Slice Studies



MaxOne MEA Chip

Sensor Array





Acute Hippocampal Slice on MaxOne MEA

MaxOne, a high-resolution microelectrode array (MEA) system, is best suited for label-free analysis of intact brain networks *in vitro*.

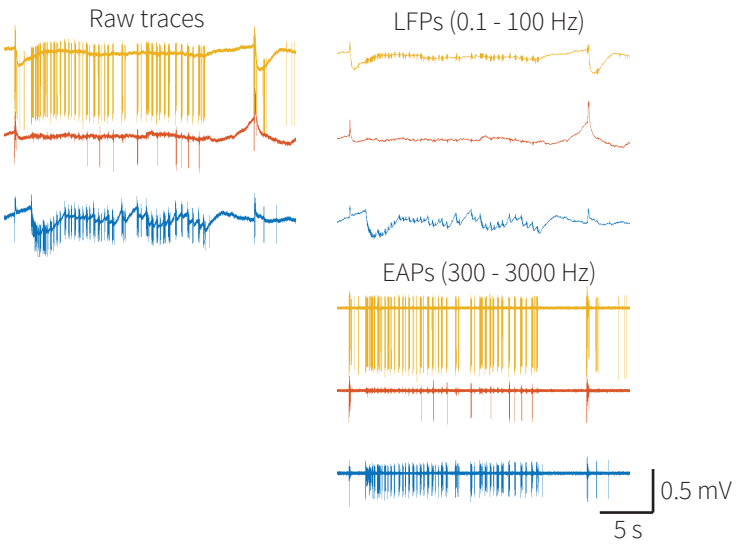
- Acute brain slices
- Organotypic brain slice cultures and organoids
- Ex-vivo brain preparation (e.g., eye-brain from turtles)

MaxOne's large sensor array at high-resolution enables recording of every active cell across multiple areas of any biological sample.

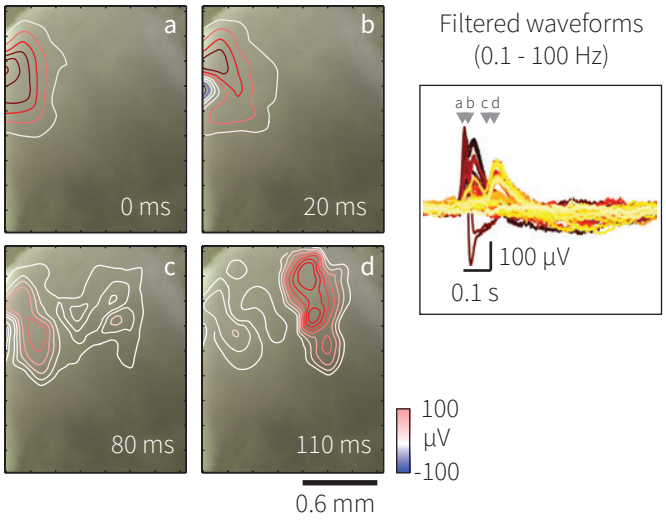
- 26,400 electrodes
- 8 mm^2 sensor area
- 3,265 els. per mm^2
- Low noise (2.4 μV_{rms})
- 20 kHz sampling rate
- Up to 78 dB amp. gain

Capture Single Neuron and Network-Wide Field Potentials

Local Field Potentials (LFPs) and Extracellular Action Potentials (EAPs)



Propagating Slow Field Potentials in an Acute Cortical Slice



Record high quality signals from active neurons on the MEA.

MaxOne enables recording of neuronal activity across multiple scales at high spatio-temporal resolution.

- Both local field potentials and spikes from intact brain networks can be detected simultaneously.
- Low noise signals facilitate the extraction of neuronal activity features from experiments.
- Propagating field potentials across brain areas can be captured and analyzed.

MaxOne

High-Density Microelectrode Array Platform

Perform Large-Scale Mapping of Cells and Synaptic Projections

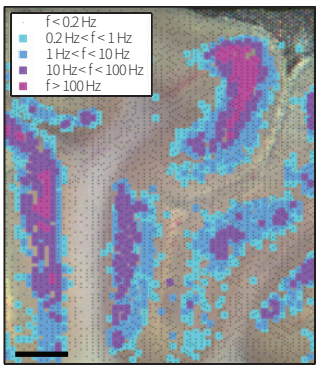
Extract and analyze the action potential spatial fields, axonal projections, and postsynaptic signals of every active neuron in the brain tissue.

MaxOne can detect spiking neurons in brain slices and can elicit neuronal activity by electrical stimulation.

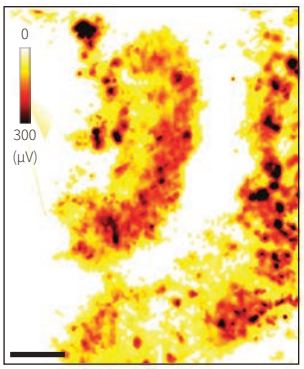
- A neuronal activity map can be extracted to identify areas of the brain slice with spiking neurons.
- Postsynaptic events can be revealed by spike-trigerred averaging as a slow +/- signal post-spike.

Neuronal Spike Activity Maps

Acute Cerebellar Slice

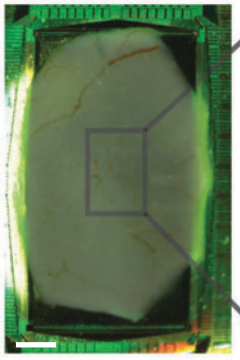


Organotypic Hippocampal Slice Culture (DIV 13)

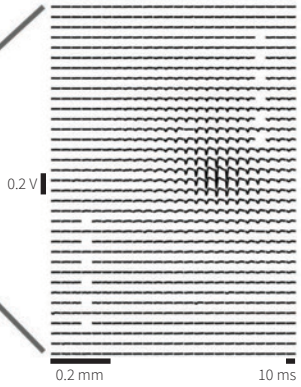


Single Neuron Spike and Synaptic Signal Maps

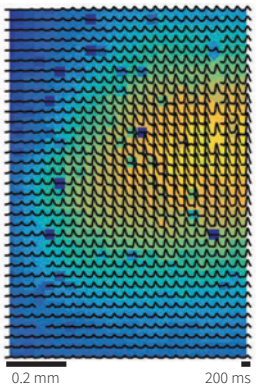
Turtle Cortical Slab



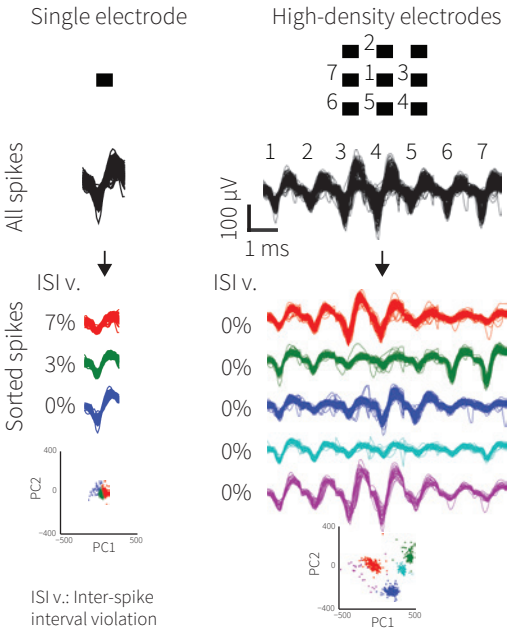
Neuronal Spike Map (200 - 2500 Hz)



Synaptic Signal Map (Raw)



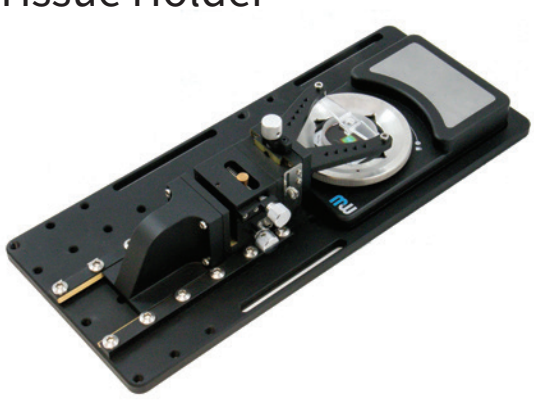
Spike Sorting

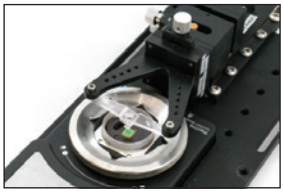


MaxOne's high spatial resolution facilitates reliable spike sorting.

Multiple electrodes detect spikes from an RGC. The additional spatial information improves the accuracy of spike clustering.

Tissue Holder





MaxOne Tissue Holder flattens the brain slice on the MEA for stable and reprocible experiments.

The tissue holder keeps the tissue pressed and fixed on the MEA throughout the experiment, in the presence of solution perfusion.

- 3-axis manipulator allows precise control of the holder.
- A membrane or a fine mesh can be used.
- A magnetic plate serves as a stand for the perfusion tubes.

References

M. Fiscella et al., J. Neurophysiol., 114:4, 2015.
U. Frey et al., Biosens. Bioelec. , 24:7, 2009.
W. Gong et al., Front. Neuroscience, 10, 2016
M. E. Obien et al., MEA Meeting 2016.
M. Shein-Idelson et al., Nat. Methods, 14:9, 2017

MaxWell Biosystems AG
Mattenstrasse 26
4058 Basel, Switzerland