



# Device for stimulating living tissues by micro electrodes

## Competitive Advantages

- A higher number of electrodes (256 against 64)
- Stimulation in parallel possible on all the ways
- Matrices high density
- Miniaturized integrated electronics: perspectives in term of increase of the density and the in vivo use

## Description of technology

Electrical extracellular stimulation of the central nervous system has been used empirically for several decades, with peripheral nerve, deep brain, and spinal cord stimulation paradigms used routinely to treat motor function loss and neurological disorders such as neuropathic pain, movement disorders, Parkinson disease, or epilepsy. Nowadays, electrical microstimulation using microelectrode arrays undergoes a strong interest for the development of neural prosthesis, such as retinal, sub-cortical or cortical implants. An important issue for achieving the best efficacy of such device requires the precise control of the spatial extent of a stimulus.

Here, we propose a new electrode configuration that improves the focality of electrical stimulation without the need to consider multipolar electrodes. In this configuration, we introduce a ground surface surrounding all the electrodes of the array. Stimulations are delivered between each electrode of the array and the ground surface. Using this configuration, a stimulation is all the more focal that the surface conductance of the ground surface is high.

An important practical advantage of the configuration is the trade-off it offers between stimulation focality and required current. Better focality can be achieved with currents less than two times higher than with the monopolar configuration. This gain is important to reduce electrode deterioration and to design low-consumption implantable devices for which battery life is an important practical issue.

## Laboratory's Know-How

Neurotechnology and Network Dynamics:  
The focus of our research: The main aim of the team is to use electrical neural microstimulation to address fundamental mechanisms of activity-dependent neural network development, and develop stimulation strategies to restore useful network activity after neural trauma. For this purpose, the team combines experimental and technological developments, including numerical modeling of the effect of electrical stimulation on neural activity. These findings are expected to benefit the development of neural implants and prosthesis.

## Applications areas

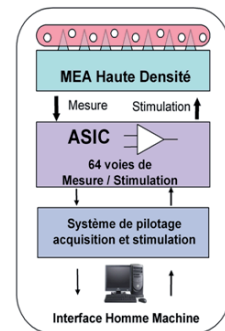
The innovation addresses implantable neuro-prosthesis & neuro-stimulation markets and more particularly those linked to neuronal dysfunctions networks compensation such as:

- Neurodegenerative diseases,
- Diseases of the spinal cord,
- Diseases of muscles,
- Sensory diseases of organs: retina, cochlea...

## Patent and IP Strategy

The innovation is protected by a patent applied in France (FR0707369) and a PCT extension (WO2009/053333).

We are currently looking for potential licensees for developing it.



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