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Localized stimulation for microelectrode array

- For information transmission to one neuron -

Motivation

To study information transmission in the brain, we have measured the stimulated response of cultured cortical neurons with a microelectrode array (MEA). Although, we can input much more information with a higher density MEA, it becomes difficult to localize the stimulated area because of the spread of electrical potential distribution.

Originality

We propose a multisite stimulation pattern to confine the electrical potential distribution around the stimulating electrode, and evaluate its effectiveness with the finite element method (FEM).

Impact

This proposed multisite stimulation pattern is an effective way of confining the electric field potential when a higher density MEA is adopted to excite one neuron and applied to a brain-machine interface for direct communication between the brain and the external world.

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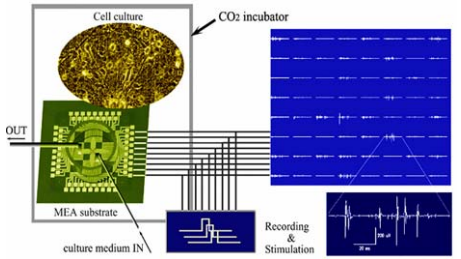
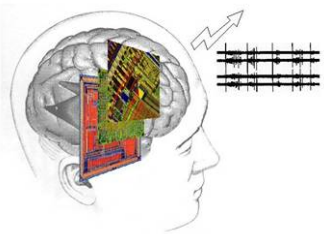
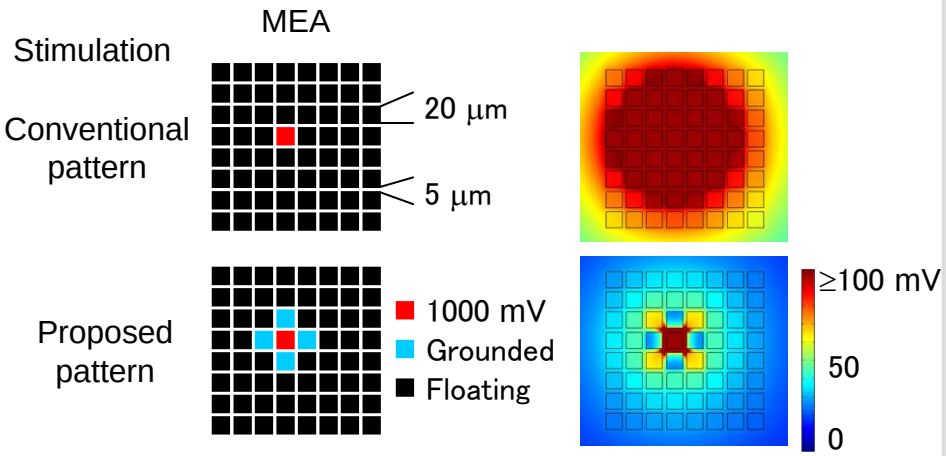


Evoked neural activity measured with MEA



Application to brain-machine interface



Simulation of electrical potential distribution with FEM

(This work is in collaboration with Keio University.)