

Automatic system for electroporation of adherent cells growing in standard multi-well plates

An electrode assembly for *in vitro* electroporation for adherent cells has been designed and patented by UPC and UB. The new system allows the electroporation in standard culture plates, achieving an enhanced and uniform electric field distribution across the biological sample monolayer and reducing the invasiveness of the operation. Partners to further develop the system and/or to establish commercial agreements along with technical cooperation are sought.

The Challenge

Nowadays, electroporation is a useful technique to introduce foreign impermeable material into the cell cytoplasm. Traditional *in vitro* equipment performs electroporation in cuvettes where cells are suspended. However, previous trypsinization process is needed when adherent cells are electroporated, causing additional stress to the cells that may affect both the electroporation efficiency and the invasiveness of the operation. In these cases, *in situ* electroporation is more suitable. Some microfabricated devices have been designed to apply the electric field pulses directly to the adherent cell monolayer. However, most of these devices are custom-built setups, not suitable for their direct use in standard multi-well plates and cells are in contact with the electrodes interfering its normal development. In addition, there are no real time methods for monitoring electroporation efficiency.

The Technology

The present invention solves the above described drawbacks. An electrode assembly has been designed, able to be positioned momentarily on top of cell monolayer keeping a short distance between electrodes and cells. This setup allows to perform non contact *in situ* electroporation on cells growing on standard multiwell culture plates. Electric field across cell monolayer is enhanced thanks to the electrodes design. This electrode assembly can be a disposable device due to the low cost manufacturing technology (Printed Circuit Board).

Innovative advantages

- *In situ* electroporation on standard culture plates.
- Microelectrodes allow the use of low voltages (<20 V) improving safety.
- Low cost manufacturing process for disposable (single use) devices.
- Possibility of manual use or with an automatic positioning system.
- Enhanced and uniform electric field distribution across cell monolayer.
- Possibility of real time monitoring by electrical impedance spectroscopy.
- Non contact between cells and electrodes, reducing the invasiveness of the operation and avoiding causing any physical stress to the biological sample.

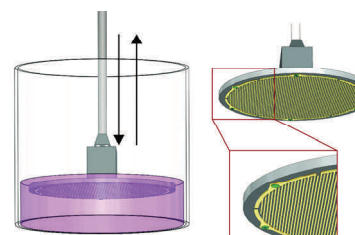
Current stage of development

Validated concept on different cell lines. Successful DNA plasmid transfection.
 Prototype with automatic positioning system and software.
 Real time bioimpedance monitoring — in process.

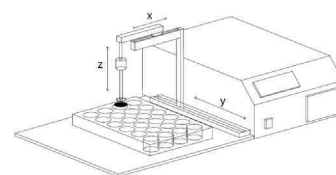
Applications and Target Market

Transfection tool for research facilities. Pharmaceutical industries. Hybridoma Production — to manufacture antibodies.

***in vitro* and low cost electrode assembly that increases electroporation efficiency and reduces invasiveness of operation**



Electrodes are placed in the surface of the multi-well plates without direct biological sample contact



Possibility of manual use or with an automatic positioning system

Business Opportunity

Technology available for licensing with technical cooperation

Patent Status

PCT application

Contact

Mr. Xavier Estaran Latorre
 Licensing Manager
 T. + 34 934 134 094
 M. +34 626 260 596
 f.xavier.estaran@upc.edu

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