

## PDMS-Free Microfluidic Chips Fabrication and Utilisation for Pulsed Electric Fields Applications

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**Abstract :** A technology of microfluidics is an emerging tool in the field of biology, medicine and chemistry. Microfluidic device is also known as 'lab-on-a-chip' technology [1]. In moving from macro- to microscale, there is unprecedented control over spatial and temporal gradients and patterns that cannot be captured in conventional Petri dishes and well plates [2]. However, there is not a single standard microfluidic chip designated for all purposes - every different field of studies needs a specific microchip with certain geometries, inlet/outlet, channel depth and other parameters to precisely regulate the required function. Since our group is studying an effect of pulsed electric field (PEF) to the cells, we have manufactured a microfluidic chip designated for high-throughput electroporation of cells. In our microchip, a cell culture chamber is divided into two parallel channels by a membrane, meanwhile electrodes for electroporation are attached to the wall of the channels. Both microchannels have their own inlet and outlet, enabling injection of transfection material separately. Our perspective is to perform electroporation of mammalian cells in two different ways: (1) plasmid and cells are injected in the same microchannel and (2) injected into separate microchannels. Moreover, oxygen and pH sensors are integrated on order to analyse cell viability parameters after PEF treatment.

**Keywords :** microfluidics, chip, fabrication, electroporation

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