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E. coli electroporation on tapered microfluidic system

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Electroporation is the technique used in creating pores on cell membrane by exposing the cell to high electric field strength. Microfluidic electroporation device takes advantages of miniaturized fluidic channel and electrode fabrication in obtaining high electric field strength using low applied voltage. In this work, the tapered microfluidic device for *E. coli* electroporation was developed based on printed circuit board technique. The tapered channel configuration with a closely spaced electrode provide maximum electric field strength in an order of 10^5 V/m which results in enough transmembrane potential drop across the E. coli cell membrane. The COMSOL Multiphysics program with AC/DC module was used in simulating the transmembrane potential with the designed microfluidic device. The fabricated device was successfully in electroporating *E. coli* cell membrane when a 30 Vp-p 1000 Hz voltage is applied across 100 microns separated electrodes. The result of the study was confirmed by fluorescent imaging and SEM.

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