

A novel microfluidic system using a reservoir and flow control system for single-cell release, migration, separation, and characterization

Mohamed Tarek Ibrahim Mohamed Ali Elwakad ,R Abdelbaset, YH Ghallab, Y Ismail

Abstract

The microfluidic chambers have become the focus of many scientists and researchers because it ensures efficient control for many functions such as cell migration and separation. In addition, the microfluidic is interested in studying the behavior of fluids within microchannels. It is also interested in the technology of the manufacturing of these micro-channels. Single cell migration and separation are the key step in several applications such as lab-on-chip (measurement the electrical properties (i.e. Impedance, and capacitance) of a single-cell), biochemistry, and cell biology. In this study, a novel technique for single-cell migration and separation using a reservoir, flow control and dielectrophoresis (DEP) is purposed. Also, sensors for the capacitance measuring is implemented for cell characterization applications. The design of the proposed microfluidic chamber is simulated and tested using COMSOL Multiphysics 5.4. The results prove the ability of the proposed system for single-cell migration and separation using a reservoir and flow control system at a lower flow rate than previous work through a single sample.

31 st International Conference on Microelectronics (ICM) 2019, December