Microfluidic micro-well (size and shape) by numerical optimization for single cell applications: Vertical trapping approach

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ABSTRACT

The paper focuses on the design of a biochip for Single Cell Analysis (SCA) using microfluidics. Several techniques have been developed for analysis of human cells. But most of these analyses are done on a group of cells assuming that all the cells within an isogenic cell population are homogenous. However, many evidences show that cellular heterogeneity occurs even within an isogenic cell population. Therefore, single cell analysis has been gaining a lot of importance in the recent past. The main objective is to design a micro-well with vertical trapping. The focus is on capturing a single cell by optimizing the shape and size of the micro-well and microchannel using hydrodynamics. The design simulation is done using COMSOL Multiphysics software. The paper provides a comparative analysis of various designs proposed, based on their performance and design parameters.

KEYWORDS:

Biochip, COMSOL Multiphysics, Micro-well, Microfluidics, Single Cell Analysis, Vertical trap.