

Factors affecting dielectrophoretic separation of cells using high gradient electric field strength system

Abstract

An investigation on dielectrophoretic separation of cells has been conducted using high-gradient electric field system (HGES). The HGES system consisted of two concentric cylindrical electrodes whereby the space between them was filled with glass beads. The glass beads were found to distort the electric field generated between the two electrodes and thus creating a high field gradient sites that produce dielectrophoretic force for cells collection. In order to study the effectiveness of the system in separating the cells, a series of experiments have been conducted. Here, yeast cells were introduced into the system and the number of cells collected was measured. The effects of voltage, flow rate, type of matrix, height of matrix and sample concentration have been investigated. In addition, the electric field analysis for the HGES has also been carried out using FEMLAB. Results show that the cells collection is influenced by the effect at the condition with and without electric field. Further analysis on the investigating factors enabled one to predict optimum values for voltage, flow rate, type of matrix, and height of matrix and sample concentration in order to improve the efficiency of the system by reducing the effect when no field is applied.

Keyword: Dielectrophoresis; Cell separation; Electric field; High gradient