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## 论文

### 阵列式对电极介电电泳芯片及其用于细胞分离富集研究

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摘要:

基于介电电泳原理, 设计并制作了一种新型的能够用于细胞分离和富集的微流控介电电泳芯片. 该芯片由沉积有金电极的石英基片和带有微管道的聚二甲基硅氧烷(PDMS)盖片组成. 通过在管道底部布置间距不同的对电极阵列, 增大了正介电电泳力在管道中的有效作用范围, 能够在降低施加电压的同时, 实现对流动体系中细胞样品的捕获. 在3 V和3 MHz条件下, 该DEP芯片对人血红细胞的捕获效率达到83%; 进一步通过将肝癌细胞捕获在芯片电极上可实现对红细胞和肝癌细胞混合样品的分离, 在5 V和400 kHz条件下对肝癌细胞的捕获效率达到86%.

关键词: 阵列式对电极 介电电泳芯片 细胞分离与富集

### Research of Cell Concentration and Separation on the Dielectrophoretic Chip with Arrayed Opposite Electrodes

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Abstract:

A prototype microfluidic dielectrophoretic(DEP) chip for cell separation and concentration based on principle of DEP was presented in this paper. The proposed microfluidic DEP chip was bonded directly with glass substrate deposited Au micro electrodes and polydimethylsiloxane(PDMS) cover plate with designed micro-channels. The effective area of positive DEP was increased by the designed electrode array which composed of several groups of opposite electrodes with different distances on the bottom of glass chip. It also made the DEP chip to capture the target cells from fluid suspension at low AC electric field. Under the condition of 3 V and 3 MHz, the capture efficiency of human red blood cell(RBC) achieved 83%. Furthermore, mixture of RBC and liver cancer cells(HepG2) was separated by capture the HepG2 on the electrode array at 5 V and 400 kHz, and the capture efficiency of HepG2 achieve 86% on the designed DEP chip.

Keywords: Arrayed opposite electrodes Microfluidic DEP chip Separation and concentration of cells

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