微流體水力聚焦現象之探討

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摘 要

本論文旨流體在微流道中之聚焦現象及傳輸機制，微流體水力聚焦之研究，成功地運用雙流體理論模 型，來探討微取樣管道中兩種微流體在不同流束下所引致之水力聚焦現象，以模擬當邊鞘流體與樣品 流體分別於一系列流速範圍下所形成的流體聚焦寬度及長度，模擬的流體物質均設定為水，因此在邊 鞘流體及取樣流體部分的密度及黏滯係數等物理特性都與水相同。在流速方面，取樣流體入口流速固 定在0.02mm/s，而邊鞘流體流相對於取樣流體流速的流速比為5.0至70倍。研究中首先詳細地介紹雙流 體理論基本原理，並對數學模型進行推導;之後利用數值模擬方法，分析雙流體模型並與實驗量測做驗 證比對。經由計算結果得知，聚焦寬度及長度與實驗量測值，兩者顯示均呈現合理一致。另外也將針 對幾項在聚焦現象中重要設計參數(內噴嘴位置擺設、直徑大小)做進一步的深入探討。

關鍵詞 : 雙流體模型，水力聚焦，微取樣管，細胞晶片，細胞計數器，微機電系統，微流道

目錄

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