

利用 3D 列印及超音波輔助溶解技術製作立體全透明生醫晶片

Fabrication of Nonplanar and Fully-Transparent Microfluidic Devices Using 3D Printing and Sonication-Assisted Dissolution Technique

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技術簡介 Technology Introduction

平面生醫晶片在近幾十年來是許多新型醫材的測試平台，但近年來許多醫學相關的文獻指出，在平面生醫晶片上的測試結果往往和臨床實驗不盡相同，其中一個重要的原因是在平面生醫晶片上，無法確實探討各參數在三維空間內的效應，因此，本研究的目的是開發新穎製程來製造一體成型的微流道晶片，用來突破目前醫材研究的困境。

Planar microfluidics has played an important platform for novel medical materials for decades, but the medical articles pointed out that the experiment results generated from the planar microfluidics are very different from the clinical trials. Hence the aim of this research is to develop a novel fabrication process to create a truly 3D microfluidic for state-of-the-art medical researches.

科學突破 Scientific Innovation

本製程是利用 3D 列印機製造三維模具，再將 PDMS 澆注於模具中，翻製出三維且全透明的微流體晶片。研究中的兩項挑戰需克服，包括如何降低 3D 列印模具的粗糙度和如何在截面積小且細長的微流道中完全溶解 ABS。我們利用溶液蒸氣來降低 3D 列印模具的粗糙度，也利用兩階段溶解及超音波輔助來加速且提升 ABS 溶解的效率。

A 3D printed ABS mold and PDMS casting were conducted to create a 3D and fully transparent microfluidic device. In the fabrication process, solvent evaporation step was used to minimize the surface roughness of a printed mold for creating a fully transparent microfluidic chip while a two-step dissolution process was used to completely dissolve the embedded and slender ABS inside the PDMS chip.

