

# 創傷敷料用 HA/PLLA 多孔性薄膜之製備與評估

研究生：邱添煌

指導教授：徐瑞坤 博士

歐耿良 博士

國立交通大學機械工程學系

碩士班

## 摘要

本實驗利用半導體製程技術製備矽晶圓圓柱陣列模仁以做為薄膜穿孔之模具，設計之圓柱直徑  $50\mu\text{m}$ 、間距  $50\mu\text{m}$ ，模仁大小為  $2\text{cm}\times 2\text{cm}$ 。將 HA/PLLA 高分子混合液旋塗於矽晶圓表面作為薄膜，然後以微熱壓方式在 HA/PLLA 薄膜上沖孔。將無法貫穿之薄膜再以離子蝕刻(RIE)方式進行薄膜穿孔處理。為了降低成本及製程手續，另外以模仁錯位對壓方式作 HA/PLLA 薄膜沖孔加工，將製備完成之薄膜進行物性分析及細胞測試。

本研究利用 ICP 蝕刻製備之模仁其圓柱深度約為  $100\mu\text{m}$ 、圓柱頂部直徑約為  $33\mu\text{m}$ 、底部直徑約為  $44\mu\text{m}$ 、蝕刻率約為  $2\mu\text{m}/\text{min}$ 、深寬比約為 1:2.27。製備完成之多孔性 HA/PLLA 薄膜，其 RIE 蝕刻率約為  $0.625\mu\text{m}/\text{sec}$ ，且孔徑一致、膜厚均勻。藉由細胞測試後，證實 HA/PLLA 薄膜具有良好之生物相容性及促使纖維母細胞增生的特性。

# The Fabrication and Evaluation of HA/PLLA Porous Membrane for Wound Dressing

Student : Tian-Huang Qiu

Advistor : Dr. Ray-Quen Hsu

Dr. Keng-Liang Ou

The Mechanical Engineering Department  
at National Chiao Tung University

## ABSTRACT

In this experiment, a series of columnar array served as punches were fabricated on silicon wafer by semiconductor manufacture process. In the mean time HA/PLLA membranes were prepared by spin coating upon the surface of wafer. Then the membranes were punched by the columnar array at elevated temperature. Holes on HA/PLLA membranes which were not fully penetrated were then processed by RIE. In order to reduce the cost, porous HA/PLLA membranes were also manufactured by punching with two shifted molds. Finally the porous membranes were tested for physical properties and cell compatiability.

Based on the experiment results, the depth of the column in the mold is about 100 $\mu\text{m}$ , diameter of the column on the top is about 33 $\mu\text{m}$ , on the bottom is about 44 $\mu\text{m}$ , ICP etching rate is about 2 $\mu\text{m}/\text{min}$ , aspect ratio is about 1: 2.27. The etching rate of RIE is about 0.625 $\mu\text{m}/\text{sec}$ . Both the hole diameter and the thickness in HA/PLLA membranes were very precise. Cell test results show that HA/PLLA memberanes have good biocompatibility and promote fibroblast growth.